September 1949 25¢

Organic Gardening

Gardening without Commercial Fertilizers

ORGANIC WAYS CHANGE 750 "WORTHLESS" ACRES INTO RICH FARMLAND

Successful Grower Tells Whole Story in New Rodale Book, "HUMUS AND THE FARMER"

HERE is the true and fascinating story of a large farm successfully operated according to organic methods. With graphic descriptions, fully illustrated, recommendations are given for the making of pastures, reclamation of waste or derelict lands, and increasing the water-holding capacity and productivity of the soil. The value of mixed farming and reforestation, the importance of the earthworm, and the mechanization of the compost method are all clearly explained in *Humus and The Farmer,* just published by Rodale Press.

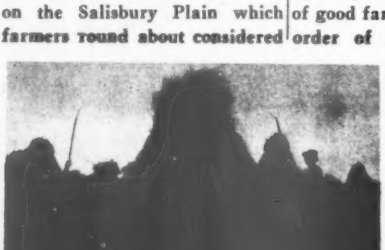
It all began when what was regarded as one of the best herds in England proved, upon government inspection, to be 66% diseased—the result of deficiencies in the food plants. The herd was dispersed and the valuable farm land sold. Friend Sykes then purchased 750 acres of land on the Salisbury Plain which farmers round about considered practically worthless. He subsoiled it and fertilized with natural manures exclusively. Pasture and crop plants were grown which were rich in minerals and other nutrient materials. As a result, the cattle and horses were maintained in such health and vigor as had been hitherto unknown, and the land is now eagerly visited by outstanding agriculturists as one of the most interesting farms in the country.

Prize Galloway Matron, Elsie II (from "Humus and The Farmer")

Artificials Uneconomical

In his valuable, exciting book, *Humus and The Farmer,* Mr. Sykes places his essential acts of good farming in the following order of importance: (1) the four-year pasture, (2) good cultivation, including subsoiling, (3) organic manuring through the grazing of stock, and (4) composting. The details he gives of some of his scientific records on the farm are startling in their originality and intriguing in their indication of the inadequacy of orthodox methods.

In discussing the organic method with present-day agronomists, the latter invariably end the discussion by saying that the ideal method of fertilization of the soil includes the use of plenty of both organic and artificial fertilizers. This is a difficult argument to refute, but Mr. Sykes deals with it convincingly and gives comparative figures to show the financial disadvantage of adding any artificials whatever to adequate organic manuring. The author foresees a dark future for agriculture if present practices are long continued.



Tripoding clover for seed (from "Humus and The Farmer")

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ORGANIC GARDENING, Dept. O.G.8-H, Emmaus, Penna.

Users Insist There's **Garden Magic** in this can!

TRY THIS ORGANIC DISCOVERY OF SCIENCE AND SEE IF YOU DON'T AGREE

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Use even sawdust and chaff. Compost garbage and sludge without odor! These make the richest humus known to man!

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See the magical difference it will make in weak, sluggish soils—just a few handfuls mixed into soil. It conditions, activates—adds life, energy and vitality.

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Use ActivO to reduce odors in outdoor toilets—while it converts the waste into an ash-like fertilizer-humus.

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All organic—no chemicals! Nature, herself—*amplified*, and packed in a can! SEND NOW FOR *ALL* THE INTERESTING DETAILS.

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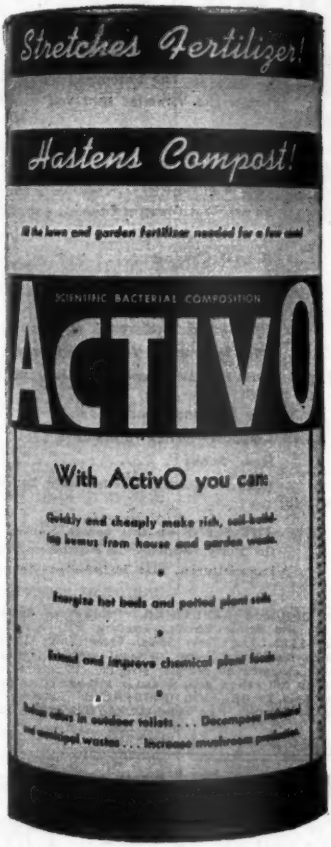

Plant a little with each seed and see the difference in your plants—and the yield! Flowers, too, have better color.

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ACTIVO

Contents

VOLUME 15, NUMBER 3 SEPTEMBER 1949

THE ONLY MAGAZINE DEVOTED EXCLUSIVELY TO ORGANIC GARDENING

Organic Gardening

Forum	3
Editorial—Cancer V ..... J. I. Rodale The Green Theory of Sulphur—Part (A)	12
Know the Vitamins that you can Produce Dr. Ehrenfried Pfeiffer	18
Miscellany	22
Botany for the Gardener (22) ..... Dr. William H. Eyster	26
Spiked Speedwell ..... G. L. Wittrock	30
Sweet Peas Grow in Emmaus ..... Dr. William H. Eyster	32
Jerusalem Artichoke ..... Edward R. Walshaw	36
A Leaf Chopper ..... Boyd E. DeLamater	38
Leaf Grinders	39
Garden Calendar—September	40
Freezing of Earthworms ..... J. A. Johnson	43
Root Systems of Vegetable Plants ..... Dr. Paul Scott	45
How to Have Plenty of Phlox and Bleeding Hearts Julie Bedier	47
The Soil and Health Foundation	49
Compost—When to Make It	50
New Books	53
Readers' Correspondence with Dr. Wm. H. Eyster	55

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ROBERT RODALE

THE SCENE on this month's cover is a corner of the garden of the Petty residence in Bethlehem, Penna. Mrs. David M. Petty, a horticulturist, also lectures on flower arrangements.

ORGANIC CULTURE

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TOP SOIL

More valuable than gold!
Without it you could not exist.

During the Fall, nature provides the material for top soil in leaves and vegetable matter. Use these for making compost.

In making compost use **EARTHWORMS** to turn it, as they add extra nutriments for your soil.

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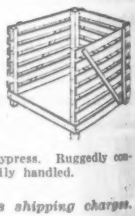
Full instructions with each order.

ORGANIC GARDENS
Perry Hall, Fullerton, Md.

SAVE TIME-SAVE LABOR-SAVE MONEY

with a WIL-GRO GARDEN AID Compost Box



This scientifically designed unit more than pays for itself with every batch of compost 4 ft. square in size. It makes over a ton in a short time; enough to cover 400 square feet one inch deep. Think what this amount of humus or other fertilizer would cost!

The Wil-gro is not just a box, it's a compost box engineered to save you time, labor, space and money. Made of weather-resistant cypress. Ruggedly constructed, yet light enough to be easily handled.

Only **$18.75** *complete plus shipping charges.*

Just the thing for the smaller garden. A compost box that measures only 38 inches square will make a good 1 ton of finely finished compost. Same rugged construction for only $15.75 complete plus shipping charges.

Willow Grove Earthworm Hatchery
257 Gilpin Road Willow Grove, Penna.

FINALLY CONVINCED

Gentlemen:

This time I am pulling in my neck —in other words I am reversing what I have said in the past letters I have written to you defending commercial fertilizers.

During the wet years we got so that we used commercial fertilizer quite heavily while we *thought* we had good results. Then came the dry spells and we found out where we were at. As a result, all my last year's supply of fertilizer is still stored away. First, I'll say, I'm not as tired as I was the last few years. So tired I just couldn't get around. I do believe it helps.

Next I am concentrating on smaller bits of land and take off more produce. For instance, I have kept track of the number of bushels of tomatoes each year, etc. I have cut down from 2100 plants to 1400 plants and increased about 150 bushels. The two past years I first planted oats in early spring, then planted my tomato plants in the oats about May 20th. Oats are disced in later. Leaves are added for a mulch. In 1948 I used about ½ bushel of compost on about 10 plants and sold 304 bushels not counting the cracked tomatoes we discarded due to dry spells and terrific rains following one another. These tomato seeds were planted in composted soil on April 15th. By May 15th, the pots were full of roots and the plants were set out in the field. This was just one month after the seeds were sown. In one more week plants were blossoming and making side branches. The first time I have ever experienced no damping off, no disease, etc. Plants were on some of the land for the third year and no blight. Plants were 3 x 4½ ft.

(*Continued on page 5*)

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Manufactured by The Espoma Co., Processors of Nitrogenous Organics since 1929

For Healthy
- LAWNS
- PLANTS
- PERENNIALS
- VEGETABLES

Restore fertility to the soil. Condition with
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Scientifically compounded of material in various stages of decomposition, ESPOMA .... the *concentrated, organic* soil-conditioner .... provides (1) immediate, and (2) continuing benefit throughout the growing year.

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All prices F.O.B. Millville, N. J.
Send cash, check or money order.

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It Renews Your Soil and Feeds Your Plants

Put Super-Compost onto your lawn and into your soil now to insure vigorous, healthy spring growth.

. . . . . .

REMEMBER:—Super-Compost has everything it takes to renew the soil, and feed the plants—all the 14 elements necessary for plant growth, and a dozen more. That makes your soil and plants complete and healthy; and your garden produce really fit to eat.

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IMPROVES LAWNS—ENRICHES SOIL—KEEPS YARD NEAT AND CLEAN—NO NEED TO RAKE, HAUL OR BURN LEAVES NOW—EASY TO RUN—2 H.P. ENGINE—STURDY, ALL METAL MACHINE—BUILT FOR YEARS OF SERVICE.
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See Your Dealer or Write for FREE Literature
PROPULSION ENGINE CORP. Dept. GA-14
7th St. and White Eagle Rd. Kansas City 15, Kans., U.S.A.

or about ½ acre. The same plot the year before produced 199 bushel with commercial fertilizer.

I never did believe compost could do so much. I have graduated from real poor soil to commercial fertilizer to compost and I know what I am talking about. With compost I will admit I have not had enough experience but I am on my way with colors. I have always said it isn't the seed; it's the soil; now I am sure it is the soil. We start out with sheet compost, clover plowed under, then we can continue with compost; that way our compost goes farther. We also plant rye and oats for plowing under our berries. Get a coat of rye and a coat of soybeans and buckwheat. This year we added a coat of weeds—all in one season.

Francis F. Rosen
852 9th Ave., S. W. R. R. No. 3
Faribault, Minn.

—o—

QUICK RETURN METHOD OK'd

Gentlemen:

Have had the same experience as article by Edwin H. Abrams in Nov-

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a series of fascinating
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See remarkable Time Lapse sequence of Dancing Flowers. Especially suitable for clubs. Seven films in sound and color include; Time Lapse Photography, Spring Blossoms. Plant Oddities. Flower Arrangements, How To Grow Iris, Gladiolus, Dahlia. Free Bulletin.
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- FEED TO EARTHWORMS

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RUHM'S
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Non-acidulated Plant Food

recommended by ORGANIC GARDENING. Increases yields, improves quality of all crops. Quick results, long lasting effectiveness at low cost. For full information write

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BRYAN & SHEFFER, Portland, Ind.
AUSTIN FEED & SEED CO., Chattanooga, Tenn.
VAUGHAN'S SEED STORE, 601 W. Jackson Blvd., Chicago, Illinois

ember issue "Quick Return Method Succeeds."

Wanting to cover up our roses before too heavy a freeze, I opened up the heap and found it, where moist, just grand. The other compost used on other flower beds seems to break down when exposed to air and moisture.

Last year while living at one of our houses in Washington, D. C., made 8 compost piles (8x12x4), the Howard Method, as there we had chickens. The best success was with a pink dogwood treated with a rock mulch and compost.

Still experimenting with Q. R. Method and can hardly wait until Spring to see whether the extra moisture secured by making the top concave to catch the moisture instead of

(*Please turn to page* 8)

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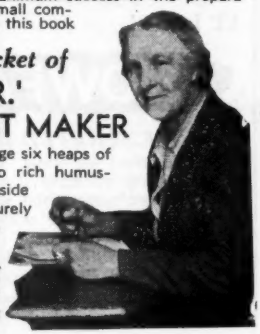

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A live yeast fungus with added soil bacteria capable of excreting enzyme activators. The yeast fungus contained in BIORG is a growing live colony that multiplies converting crude carbohydrates into soluble sugars and other products of decomposition.

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ENERGY SUGAR—as dried molasses—A. P. F.—Animal protein GROWTH factor Plus minerals and vitamins from yeast.

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shading it as I did before is noticeable.

Many thanks for any information you can give me.

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Brothers of Holy Cross
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—o—

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(*Please turn to page* 10)

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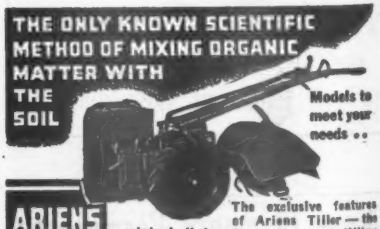

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Than Hand Raking

REMOVES ALL LOOSE GRASS AND LEAVES

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- BRIGGS & STRATTON Type "N" Motor *(FOR BLOWER ONLY)*

EXCELLENT FOR COLLECTING COMPOST MATERIAL

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Sensational invention. Plant "eats" pot. FERTO-POTS are made of a rich cow manure mixture in automatic pot machines and kiln dried. Start Bulbs, Seeds, Seedlings, Plants, cuttings in FERTO-POTS. Pot and all goes into the ground. No Wilt, No setback in transplanting; better results; greater satisfaction; larger profits. Pots soften in the moist soil and feed the plants. FERTO-POTS have taken the garden world by storm. Millions sold. Two sizes No. 2½—100 for $2.75; 250—$5.00 and No. 3—100 for $3.25; 250—$5.75, by express, (not prepaid.) Use FERTO-POTS this Fall and enjoy a thrilling new garden experience.

CLARENCE B. FARGO
14 FARGO BLDG. FRENCHTOWN, N. J.

ing the other is due to be yielding, in turn, twelve months later.

Mrs. Arthur K. Akers,
206 Burns St., Forest Hills, N. Y.

—o—

COMPOST PROVES WORTH

During the past three years I have been applying compost on my garden plot made from poultry manure, grass, weeds, Kudzu, a few oak leaves and chopped-up corn stalks with a sprinkling of earth and lime to the successive layers of vegetabe matter and manure in the heap. The application of this compost material to the garden has greatly increased its productivity, making it possible to produce well developed radishes and turnips where previously root crops of this nature would not develop; also chinese cabbage and cabbage are possible to grow successfully where previously the worms defeated our efforts. So far, however, English peas have not been very successful.

Vern S. Holmes,
523 Lee St., College Park, Ga.

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CANCER—PART V

THE GREEN THEORY OF SULPHUR—PART (A)

A FEW years ago, in combing libraries for books on the subject of cancer I came across a slim volume called *The Cancer Problem* written by C. E. Green, who strangely was not a physician. He was a publisher of medical and legal books, dictionaries, text books, etc. His theory of the causation of cancer is so interesting and important that it deserves a place in this series of articles. It was accepted by many physicians.

Mr. Green has demonstrated by facts, by theory, by statistics and by scientific study, a peculiar condition of our civilized lives, that one of the causes of cancer is coal smoke, and that the specific offender in this case is the sulphur in the smoke. That took my interest immediately because I knew that the sulphur in chemical fertilizers is a dangerous ingredient. What was my amazement as I read along in this brilliant volume, to see Mr. Green (and mind you this was written in 1917) attacking the use of sulphurs in chemical fertilizers.

Because of the importance of Mr. Green's work and the detail in which it should be treated in this series it will have to be covered in two installments. In the first section of his book Green shows that in parts of Scotland and England which he has studied, where people live on more or less flat land there is far less cancer than in hilly regions, for the reason that where houses are on hills the coal smoke eddies and flurries more and part of it may go back into the houses.

"For example in London", says Mr. Green, "we have the amazing fact that cancer accounts for 1 death in every 5.88 deaths from all causes in St. Marylebone, while it accounts for only 1 death in 54.10 from all causes in Stepney. In other words, cancer is 10 times as common in St. Marylebone as it is in Stepney." The figures are the latest available to Mr. Green in 1917. St. Marylebone where cancer is heavy is a hilly section, while Stepney is more or less flat.

Mr. Green made a remarkable study of the cancer statistics in Scotland, and motored over practically every Scottish county to study the variations of the terrain and the use of coal as a fuel to see its effect on cancer deaths. He says:"I was impressed very strongly with the fact that those where the death-rate was low were comparatively flat, or at most had low, swelling, undulating hills, with houses built on their sides, whereas those where the mortality was high were intersected with gullies and valleys, with the houses as a rule situated in the hollows.

"To take, for example, the county showing the highest death-rate in Scotland, viz. the rural districts of Nairn, with a mortality of 9.73: the northern part of this country is largely made up of deep valleys with wooded sides, and the houses in the hollows. About four miles from the sea, however, the land slopes down to an almost flat stretch of country, at the extremity of which is the town of Nairn, where the mortality drops, as will be seen, to 4.11.

"A very similar case is that of Dumbartonshire, which has a mortality of

7.37. The county itself is very rough and hilly. The town, on the other hand, is situated on a wide flat beside the Clyde. The mortality figure of the town is only 1.81, as compared with the 7.37 of the entire county."

Then Mr. Green studies all of the principal towns and large town districts of Scotland and appends the results in a chart. The chart is arranged by towns that have the most hilly and sloping conformations first, including those that are in deep hollows, and then those that are medium, gradually tapering off to those that are most flat. The results seem unbelievable.

At the head of the list stands the town of Forfar with a death rate of 7.02. It is a town which stands 200 feet above sea-level in a kind of a basin formed by the surrounding slopes. In the chart are listed 35 towns. At the bottom of the list is Kirkintilloch whose location is a low flat plain. He says, "From these groupings it will be seen that the towns lying in a cup have by far the highest cancer mortalities, while those on a level site with level surroundings show the lowest percentage. Those on hilly sites are slightly higher than those on sloping sites. I have invariably found the same set of conditions in England."

Green gives an example from Germany. He says:

"In dealing with this subject, when the situation of a town seems to have so marked an influence upon its cancer mortality, it would be even more valuable to discover whether there were certain portions of the larger towns more liable than others. There has been a most interesting piece of work done by Behla (Cent. f. Calst., 1898, and Zeits. f. Hygiene, 1898.) on his own town of Luckau, which seems to me to bear very strongly upon the view which I have sought to bring forward. In the course of twenty-two and a half years' practice in this town he noticed that while he had never met with a case at all in the Sandoer suburb, in the Kalauer there was hardly a house which had not had several cases in it. In order to show the lie of the ground and the relative positions of the two portions of the town, I had it specially photographed, and found that the Sandoer portion, in which no case had occurred in the twenty-two years, lies on the height; the Kalauer lies in the hollow."

Green goes on:

"If, then, the lie of the ground seems to have a mysterious influence on the local incidence of cancer, how can this be explained?

"Reference has already been made to the extraodinary mortality from cancer among chimney-sweeps and to the fact that the disease is rare among miners who are workers in unburnt carbon.

"I may say at once that I am convinced that the local incidence of cancer can only be explained by its *relation to the elimination of the products of fuel combustion from the houses or from their surroundings.*

"If coal soot or some of its ingredients can cause epithelioma in chimney-sweeps, as is proved by the figures of the Registrar-General, and coal tar bring it on in coal tar workers, as is proved by the Home Office having drafted special regulations for them, is it not reasonable to suggest that the inhabitants of a district where the products of coal combustion are imperfectly removed should be more subject to cancer than dwellers in a district where these are more perfectly removed?

"When I first realized that the disease was more prevalent in certain districts than in others, I carefully examined the exterior of the individual houses in which I could discover that cases had occurred in my own neighborhood. I disregarded cases in which the occupants had been less than three years in the house, and also those of men who went out to business all day.

"For a long time I could find nothing in common between these houses, which were of all descriptions, from isolated country cottages to large suburban mansions and city flats, until it occurred to me that many of them

had appliances on the chimneys, evidently designed to encourage and increase the draught. A further inquiry elicited the obvious fact that in nearly all of the houses some of the rooms were smoky.

"This question of the relation of chimneys to cancer has never been previously referred to, but I believe that it is of great importance. The products of coal combustion in a room must either go up the chimney or out into the room. If the chimney is defective the latter result ensues. A proper chimney should carry all these products out into the atmosphere. Wherever cowls or other appliances are placed on the chimney heads it is a proof that the smoke has in that chimney a tendency to come out into the room instead of being drawn up. It must also be borne in mind that fumes may be coming out into a room although no smoke is noticed and that this filthy, soot-lined tube loaded with combustion products is admittedly a source of ventilation to a room, not only by drawing air up, but by passing cold air down.

"Wherever the head of a chimney is below the level of the surrounding roofs or of the surrounding ground, the tendency is for the smoke not to rise. It will often be found that the chimneys on one side of a house will not draw, while those on the other draw excellently. On a slope, the chimneys of the houses at the top of the slope will usually be found to draw better than those on the slope itself. Trees often have the same effect as an adjoining roof or an adjoining slope, and this to my mind is the explanation of the oft-repeated suggestion that the proximity to tall trees has some connection with cancer.

"I believe, indeed, that the roof level of a city has more to do with its cancer death-rate than anything else. If streets of sky-scraper buildings are alternated with rows of smaller houses, the products of combustion cannot be properly eliminated from the latter or from the district. (See Fig. IV and V.). This surely accounts for the fact that cancer is the cause of 1 death in 7 in the Strand district and only 1 death in 54 in Stepney, where the houses are all much of one height—small two-story buildings. Although London has a flat site the benefit from this is lost by such conditions as shown in Fig. IV.

"Glasgow has a very low cancer mortality, although it is a large industrial centre, but it has both a flat site and its roof line is phenomenally flat and level, as shown in Fig. V. All the houses in this district are of the same height. Stepney has also the lowest death-rate from cancer in London—nearly as low as Glasgow. If its roof line is compared with that of the Strand district the difference will be at once apparent."

Green then cites examples from Jamaica, Mexico, the American negro, North American Indians, Iceland, Faroe Islands, Greenland to show how his theory remarkably fits in with the cancer figures. "In Jamaica, for example," he says, "where there are no house-heating chimneys, and where all cooking is done outside, the cancer death-rate is inconceivably small, viz. 1.6 per 10,000 living.

"In Mexico, it is almost unknown in the hot regions, whereas in the cool regions on the high plateaux it is frequent. In the plateaux they have to burn fires; in the hot districts they do not.

"Roger Williams (*Natural History of Cancer,* page 22) and Hoffman (*The Mortality from Cancer throughout the World,* page 142) both show that the disease increases in frequency with remoteness from the Equator, and the former asks how the much greater prevalence of malignant tumours in temperate than in hot climates which his world-wide survey reveals can be accounted? To my mind it is obvious. The further from the Equator the greater the necessity for artificial heat, with its concomitant products of combustion."

I looked up the reference to Hoffman's book and it is an amazing corroboration of Green's theory. In 35

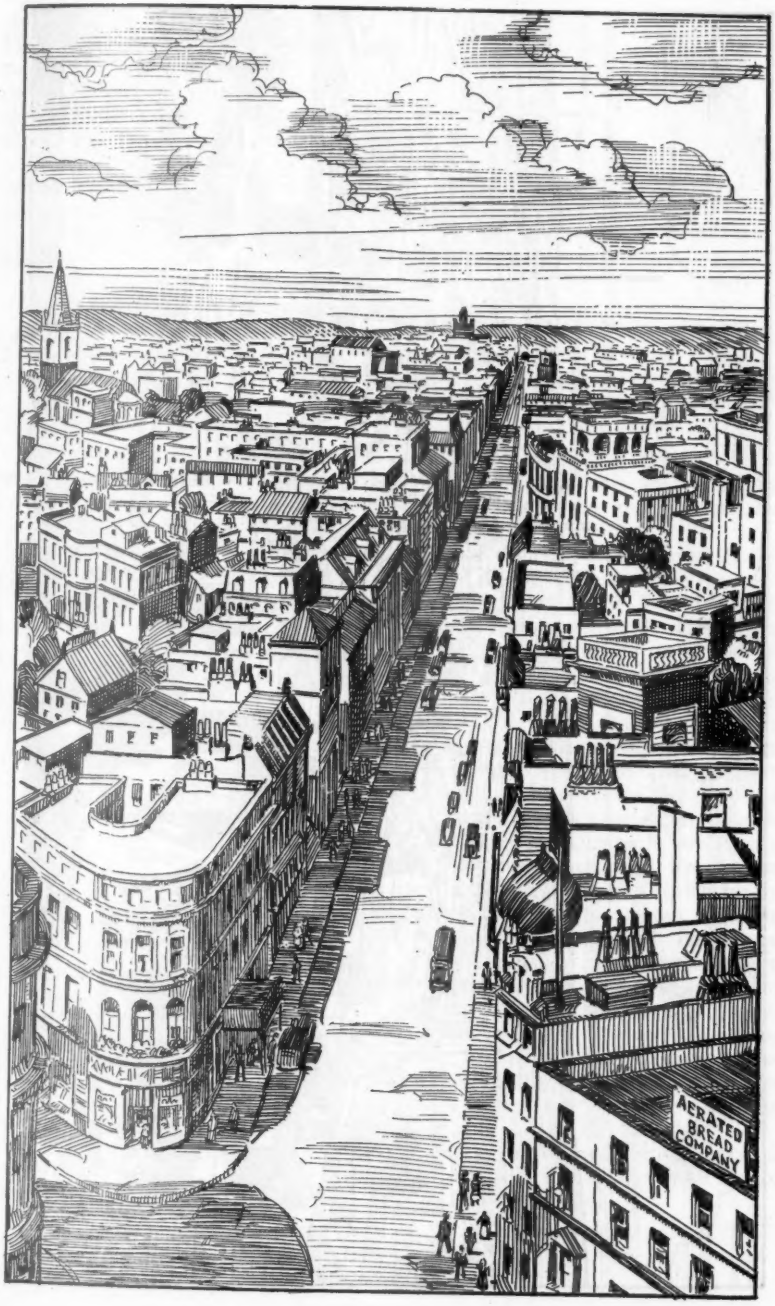


Fig. IV—Marylebone

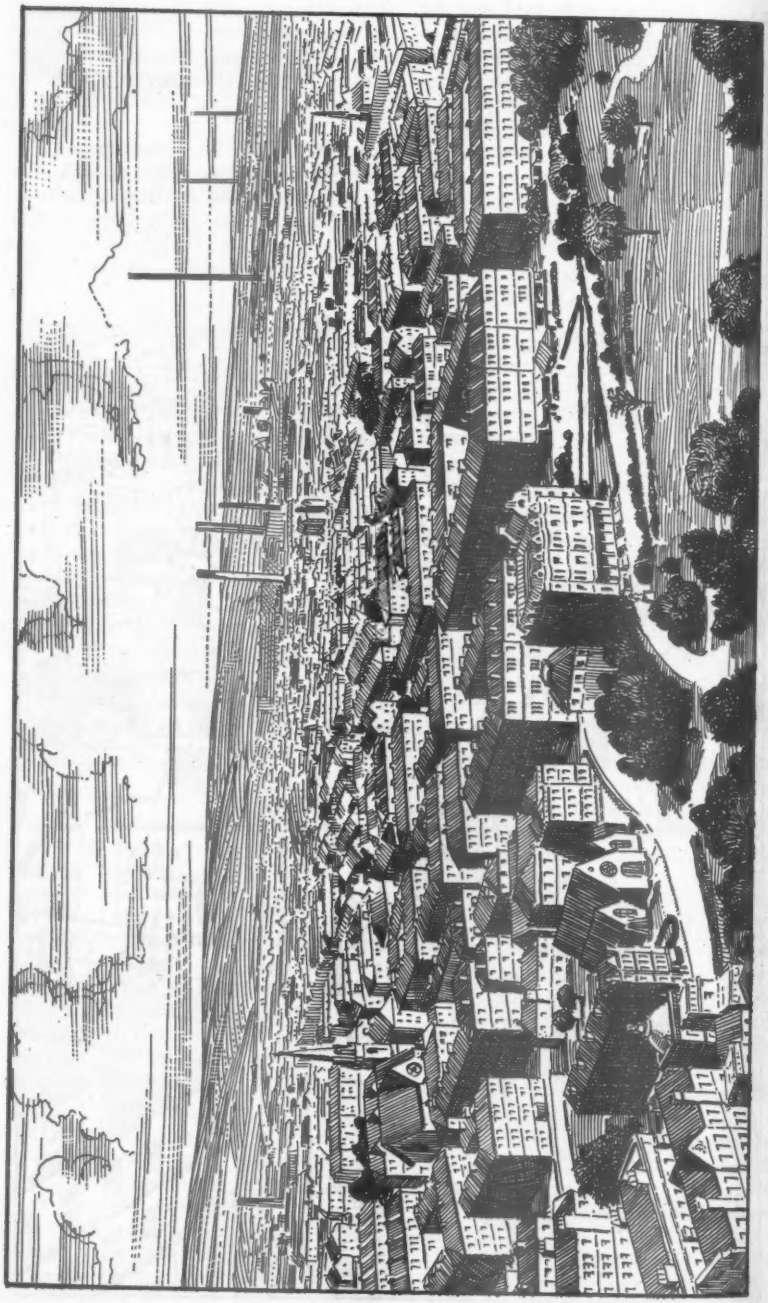


Fig. V—Stepney

cities studied that are 60 degrees north of the equator, the deaths from cancer (1908-1912) were 105 per 100,000 of population. In 48 cities 50 degrees north, that is, 10 degrees farther south, the cancer figure declines from 105 to 92. Going 10 degrees farther south to 40 degrees it goes down to 78. At 30 degrees from the equator cancer is down to 42. At 10 degrees it is down to 40. It shows up in table form as follows:

Degrees of Latitude	Cancer Deaths
60 N — 50 N —	105
50 N — 40 N —	92
40 N — 30 N —	78
30 N — 10 N —	42
10 N — 10 S —	40

Here are the cancer figures (1947) for the U. S. per 100,000 of population, by States:

Alabama	83.6
Arizona	80.9
Arkansas	85.5
California	138.3
Colorado	141.1
Connecticut	157.3
Delaware	138.1
Dist. of Columbia	135.5
Florida	116.1
Georgia	86.3
Idaho	108.0
Illinois	161.2
Indiana	131.2
Iowa	146.3
Kansas	124.9
Kentucky	106.6
Louisiana	107.4
Maine	160.5
Maryland	136.1
Massachusetts	173.3
Michigan	129.4
Minnesota	139.4
Mississippi	86.5
Missouri	148.0
Montana	145.9
Nebraska	141.1
Nevada	116.5
New Hampshire	168.7
New Jersey	164.3
New Mexico	77.9
New York	174.9
North Carolina	74.8
North Dakota	116.5
Ohio	143.2
Oklahoma	104.5
Oregon	121.4
Pennsylvania	141.6
Rhode Island	166.6
South Carolina	72.2
South Dakota	133.0
Tennessee	95.4
Texas	96.0
Utah	85.2
Vermont	156.8
Virginia	99.3
Washington	127.4
West Virginia	99.1
Wisconsin	149.6
Wyoming	83.8

In concluding this installment of Green's book let me quote an interesting excerpt:

"That the fuel was received at first with disfavor appears from the fact that in the reign of Edward I the nobility and gentry made a complaint to the king objecting to its use, on the ground of its being a public nuisance. By the middle of the seventeenth century the use of coal was becoming more general in London, chiefly owing to the scarcity of wood, and its effects upon the atmosphere of the town will be inferred from a proclamation issued in the reign of Elizabeth, prohibiting its use during the sitting of Parliament, for fear of injuring the health of the knights of the shire. About 1649 the citizens again petitioned Parliament against the use of this fuel on account of the stench; and about the beginning of that century, 'the nice dames of London would not come into any house or room when sea-coales were burned, nor willingly eat of meat that was either sod or roasted with sea-coale fire'. (Stow's Annals)."

(To be continued. It is possible that this series may run into ten or twelve installments.)

Fig. V—Stepney

Know the Vitamins that you can Produce

by DR. EHRENFRIED PFEIFFER

FOR those who care for healthful and nutritious food, vitamins have become a condition sine qua none, i.e. without which one cannot exist. True, without vitamins one cannot survive and be healthy. Vitamins are contained in various natural products, vegetables, fresh fruits, certain animal organs and meats. With a well balanced diet, particularly of fresh vegetables and fruit grown on healthy soils, the vitamin supply of the human body can be maintained, otherwise humanity would not have survived up to the present day.

Modern technology and economy have introduced the shipping over long distances, storage over long periods, and especially the processing, pasteurizing, sterilizing, dehydrating and other ways of handling foods. Some of these processes are harmless, others destroy some of the vitamins, particularly the more volatile and those sensitive to heat. The same technology has then produced vitamin concentrates, preparations of varied formulae and origins in order to make good the incurred losses and to enable man to balance a diet which would otherwise be unbalanced. Eating habits have also had an influence, for people just don't like to eat what is good for them. This accounts for the typical meat eater who shuns fresh fruit, orange and lemon juice. Certain vitamin deficiencies can be overcome to a certain extent by supplementary preparations.

Then chemistry has also been able to synthesize a few of the vitamins. Whether these synthetic vitamins are essentially the same as natural ones is a question which cannot definitely be answered. Some believe that they are inferior, others produce evidence that they are also effective. A clear answer can only be arrived at in time as the result of further research in this field. One thing is sure, however, that natural and balanced food is still the healthiest and cheapest supply.

An Army experiment carried out on a large group of men has not revealed any difference between the vitamin fed group and the group receiving none. Both groups were on a basic, nutritious diet. This experiment seems to knock the props out from under the platform of the vitamin supplement advocates. It proves, however, that with a basic, healthy ration all that is needed can be supplied. This does not contradict the fact that certain diseased conditions necessitate an extra supply. Medical science has demonstrated this necessity. But the extent to which vitamin preparations are necessary as a remedy or cure should be left to the insight of the physician. For the same medical science has ample evidence that the indiscriminate use of vitamin preparations and particularly the excessive use under conditions where the normal supply is abundant may cause trouble. It is a question for the judgement of the physician and dietitian as to when and how much supplementary vitamins are to be given. There is also the possibility that one organism may be able to make better use of food than another, which is an entirely individual factor. We said that "the natural supply can be abundant". If you take the average figures found in text books, however, you can make the mistake of taking it for granted that your own food supply contains the average amount.

We know that there are vitamin deficiencies in poorly grown natural plants. Different soils result in different vitamin contents. Natural healthy soils will produce a better vitamin

content in plants than run down soils, or those which are forced to production in a onesided way. This problem has a certain similarity to the production and maintenance of proteins and carbohydrates and their relative proportions in plants grown on different soils. Organic soils with a high humus content produce the highest amounts of vitamins. The best procedure would be to label vegetables, fruit, etc., as to their actual contents if one wishes to know which is the highest quality.

Certain vitamins are synthesized in the animal body and by means of bacteria in the digestive tract. The main sources, however, are plants. In them a balanced state has been reached and the vitamins are contained in a form which can be assimilated easily. Agricultural methods have a measurable influence upon the presence or absence of vitamins in plants. Studies of this subject are, unfortunately, only in their beginnings. When it is said that carrots are a source of carotene and vitamin A it is not at all sure that every carrot is a source, nor is it sure that the vitamin A content of carrots grown on different soils is the same. An important study by Firman E. Bear has been published in *The Land*, Vol. VII, No. 3, Regional Variations in the Mineral Composition of Vegetables. These studies should be enlarged to investigate the specific treatment of soils with fertilizer, compost, raw or composted manure. Only then will we be able to state which agricultural methods secure the highest nutritive values in our food.

For the time being we will have to be content with knowing the average availability in general in our vegetables. For purposes of orientation, we will draw upon tables of known vitamin sources in our garden. These should, however, be considered with the traditional grain of salt. Unless scientific analytical tests have proven that *his* vegetable is rich or poor on account of the specific soil or treatment, this information can only be useful in a directional sense. Unfortunately, past scientific research has neglected this point of view. It has not linked with the vitamin test of a vegetable the kind of soil on which it was grown, the treatment of the soil and other vital conditions under which it was cultivated. We have heard of carrots which did not contain vitamin A. The differences in the feeding value of grains are quite obvious. Even when the protein and mineral contents are much the same there are evident variations due to the different soil origins. The fact that we have "enriched" flour, milk, etc., in itself is proof that there are artificially created shortcomings.

Let us now consider the various well known vitamins, symptoms of their deficiency, sources, etc., so that we may become better acquainted with these vital essential substances.

Vitamin A:

Deficiency symptoms: Certain eye diseases (xerophthalmia—the eye becomes hemorrhagic, incrusted, infected), night blindness; loss of weight and lowered resistance to infection occur but are not specific for vitamin A deficiency alone. Yellow pigments, such as in carrots, contain carotenes which are transformed into vitamin A.

Principal sources: *High* (more than 10,000 units, in order of contents from high to lower): Parsley, broccoli leaf, kale, dandelion (spring salad), spinach, escarolle, Swiss chard, alfalfa leaf, dock leaves, lamb's quarters.

Medium (1,000 to 10,000 units): Pig's liver, calves liver, dried apricots, broccoli flour, red pepper, mature carrot, collard greens, sweet potato, egg yolk, green lettuce, yellow peach dried, squash, prunes, fresh apricots, banana powder, broccoli stem, cream cheese, butter from cows on pasture contains twice as much as that from cows on dry feed, cheddar cheese, parmesan cheese, Chinese cabbage, green celery stalks, ripe red tomato.

Low (100 to 1,000 units): Asparagus green, cherry (Late Duke and Montmorency), cream (20%), mutton kidney, green pepper, mature green tomato, avocado, cantaloupe, cherry (Napoleon and Early Richmond),

dried yellow corn, dried milk (from cows on pasture three times as much), okra, globe artichoke, banana (yellow ripe), blackberry, Brussels sprouts, cherry (Deacon and Bing), dried cow peas, cured dates, lettuce (iceberg), average whole milk, green olives (ripe olives somewhat less), oyster, pecans.

Very Low: Apples, beef, young cabbage, cauliflower, cottage cheese, cranberry, cucumber, eggplant, figs, grapes, orange juice, pineapple, potato, raisins, watermelon, yellow turnips.

Frozen foods retain their vitamin A content fairly well, while dehydration and drying (with a few exceptions) results in considerable losses. Foods which naturally store well keep their contents up to 9 to 12 months.

Vitamin B Complex: Several vitamins belong to this group, B_1, B_2, and a heat stable factor, sometimes called vitamin G. B_1 is also called thiamin, the antineuritic factor which is not stable when heated. B_2 (also G) is riboflavin a growth factor, niacin or nicotinic acid is the pellagra preventing factor (pellagra, a disease frequently seen in the South and among the poor); Biotin (also called vitamin H) is needed for the growth of yeast, mold, and bacteria; folic acid, a growth factor for chicks and bacteria. This listing of compounds may seem superfluous yet it gives us a picture of how complicated this vitamin is and why it is called a B complex.

Thiamin or B_1 is connected with nervous and circulatory disturbances. A deficiency is indicated by beriberi in man and manifold nerve inflammation in birds (poultry), loss of appetite occurs and finally paralysis. Of course, not all of these symptoms are caused by a B_1 deficiency. Thiamin plays a role in carbohydrate metabolism.

Excellent sources of thiamin (B_1): Animal products, lean pork, chicken, kidneys, liver, vegetables and seeds, green peas, green lima beans, wheat, corn, rye germ, rice polishings (housewife beware of white polished rice, you might just as well eat sawdust), wheat bran, oats, whole wheat, i.e. all whole grain, brown rice, peanuts, soybeans, cowpeas, navy beans and dried peas.

Good sources of B_1: Animal products, egg yolk, brains, lean meat, fish roe, cod, sardines, whiting; vegetable sources, fruit and seed, potatoes, sweet corn, sweet potatoes, Brussels sprouts, cauliflower, cabbage, mushrooms, spinach, turnip greens, water cress, garden cress, lettuce, collards, kale, onions, leeks, tomatoes, wax and green beans, parsnips, beets, carrots; prunes, avocado, pineapple, oranges, grapefruit, tangerine, dates, figs, plums, pears, apples, cantaloupe, hazelnut, chestnut, brazil nut, walnut, almond, pecan.

Fair sources of B_1: Fresh milk, turnips, broccoli, kohlrabi, eggplant, banana, watermelon, raspberries, blackberries.

It is in the nature of the heat unstable form that raw vegetables and fresh foods are preferable. Recent research has shown that cooking for a longer period, even at lower temperatures, does more harm to the preservation of vitamins than brief cooking at a higher temperature. In fact, the pressure cooker, used with care, gave better results than long boiling. Of course, one avoids complete destruction (maceration) with pressure cooking. Roasting, to a certain extent broiling, and cooking with soda are most harmful.

Riboflavin B_2 *sources*: *Excellent*: Animal products, liver, kidney, heart, lean muscle, meats, eggs, cheese, dried or condensed milk; vegetable products, turnip tops (what is usually thrown away), beet tops, kale, mustard greens, wheat germ, rice polishings (again that which is thrown away), peanuts, soybeans.

Good sources: Besides milk, buttermilk and whey; peas, lima beans, spinach, water cress, collards, endive, broccoli, green lettuce, cabbage, cauliflower, carrots, beets; pear, avocado, prune and peach; whole grains, and dried legumes.

Fair sources: Bananas, figs, grapefruit, oranges, apricots, guava, papaya, muskmelon and apple.

The human requirements of riboflavin are low, 1 to 3 thousandths of a

gram per day. Riboflavin deficiencies show up in reddening of the lips and sores in the angle of the mouth, arresting of growth (not typical alone), inflammation of the tongue, roughening and hardening of the skin.

An interesting point in regard to riboflavin is that its content in wheat may vary as much as 300% from one region to another.

Niacin or nicotinic acid, another of the B complex is connected with pellagra, a disease prevalent in the Southern States, connected with skin disorder, diarrhea and later dementia. It is frequently caused by a onesided diet of chiefly fat pork, molasses (sugar) and cornmeal. It can be cured with fresh milk, lean meat and eggs.

Excellent sources of niacin: Animal, pork, beef and veal liver, particularly from pastured animals, animals from the feed lot contain much less; plant sources, dried pinto beans, peanuts, yellow soybeans, wheat germ, rye middlings, whole rye.

Good sources: Almonds, chestnuts, bananas, kidney beans, egg yolk, oats, brown rice, rutabaga, whole wheat, wheat bran.

Fair sources: Lean beef, eggs, fresh ham, salmon, chicken meat, oysters, cabbage, carrots, green peas, potatoes, spinach, sweet potato, orange juice, barley flour.

Vitamin B_6, connected with skin disorders, is found in grain seed (whole wheat, rye, etc.), legume seeds, yeast, meat and fish.

Pantothenic acid, another B complex, is found in liver, yeast, eggs, peanuts and whole wheat. It is interesting that it is found in the royal jelly of bees which is fed to the young larvae during the first two days, while after that only the would-be queen gets more of it.

Biotin (also vitamin H): is a growth factor for yeast.

Excellent sources: liver and kidney. Small amounts are found in egg yolk, tomatoes and carrots.

Inositol, of importance to mice, poultry and yeast, is found in liver, meat, kidney, brain, and various fruits and vegetables.

Vitamin C or ascorbic acid: Deficiency of this vitamin causes scurvy, the disease dreaded by seafarers, road builders, lumbermen, and others who live in camps and eat canned foods. Symptoms are bleeding of the gums and pathological changes in the teeth.

Excellent sources: Oranges, grapefruit, lemons and their juices; broccoli, greens, strawberries, horseradish, kohlrabi and peppers.

Good sources: Beef liver; apples, cauliflower, cabbage, cantaloupe, cranberries, grapes, papaya, pumpkin, radish, tomato, turnip.

Fair sources: Asparagus, banana, celery, beans and peas (green), rhubarb.

Fresh fruits and vegetables are of the greatest importance here, dried cereals and legumes contain practically none, while in sprouting seeds (the bean sprouts of the Chinese and the wheat of the Russians) vitamin C appears again. Raw cabbage (cole slaw) and asparagus tips are rich in it, sauerkraut and cooked asparagus contain none. Orange juice maintains its content if kept cool in the refrigerator, up to 24 hours. Ascorbic acid is very unstable and deteriorates easily in food or juice mixtures. Pure, raw juice is important.

Vitamin D also represents several subgroups. D_2 is called calciferol and has a bearing on bone development in connection with the calcium and phosphorus metabolism. Bowlegs, swollen joints, knock knees, all develop as a result of its lack. In rickets, for instance, incomplete calcification is observed as well as a low blood phosphate. (I have observed much of this in pigs too.) There are few natural foods containing vitamin D but exposure to the ultra violet rays of the sun (not those received through ordinary window glass, but out of doors) brings about the formation of vitamin D in the body. Even so called ultra-violet glass loses its ability to let these rays through when even a very thin layer of dust or grease has settled on them.

In nature, vitamin D is found only in cod liver oil, the livers of other

fish, such as halibut, tuna and swordfish, less in egg yolk, milk and butter (in the latter probably only in butter from pasturing animals). It is not only important that children and livestock are kept in light, ventilated rooms, but that they also get daily exercise in the fresh air and sunshine.

Vitamin E (or Alpha-Tocopherol) is connected with normal reproduction and growth. The outstanding source is in wheat germ oil, consequently in untreated and unheated whole wheat; it is also found in whole oats (every farmer knows that timothy hay and oats keep the bull in a lively condition), in egg yolk, beef liver, and in green (not blanched) lettuce leaves. Atrophy of voluntary muscles develops too in vitamin E deficiency which can be cured by its administration provided the B complex vitamins are present.

Vitamin K has a bearing on the clotting of blood, counteracting a certain type (but not every type) of pathological bleeding. It is formed in the putrefaction or fermentation of manure. Natural sources are the green leaves of alfalfa, spinach, cabbage, kale and cauliflower, tomatoes, but little or none in other fruit. Certain bacteria produce this vitamin but yeasts do not. Feces are rich in it. This opens a prospective line of research in composting manures with green plant parts by means of bacteria, but not by means of yeasts. Also the use of alfalfa as a mulch for fruit trees, especially citrus trees becomes an interesting item for research. K_2 is formed during putrefaction. In California, mulching with alfalfa is considered to produce the healthiest trees.

You may feel overwhelmed by the complexity of the vitamin picture, doubtful of whether the vegetables you grow contain even a less than average content of the various ones. However, one thing is sure, taking vitamin capsules may be of little use and the odds are better for your receiving a sufficient amount in your diet by growing your own vegetables with good garden practices. The good practices which we favor, of course, are organic ones. Until it has been proven that these will not produce high vitamin contents it will not harm to continue with them.

Miscellany . . . . .

SUNFLOWER SEED EATING

For those who find difficulty in cracking the seed, Mabel N. Andrews of Orlando, Florida suggests:

"In preparing Sunflower seed for eating, I have found the best way is to pour *hot* water over them and off in half a minute, then let them stand covered for 5 or 10 minutes. They will then crack easily and quickly."

RESULTS

Columnist B. G. Clough in his column *DIG AND BE WELL* in the Oceanside Post Dispatch of July 7, 1949 said:

"You may really become enthralled in this subject, and your organic gardening may grip you like a virus 'X.' It's likely! This is no fad. Ample proof is forth-coming and visible in so many places. Take the one case of Mr. and Mrs. Charles Dinius, of Vista, California, previously written about in this paper by yours truly. In January '48, two hundred deciduous fruit trees were pruned to knee height then planted. Worms and compost were added at that time and adequate water provided. In six months time these two-foot bare sticks were leafy structures eight feet tall and as wide. By direct contrast untreated areas had merely put out a small group of leaves and generally shown small progress. No spraying was necessary for there were no bugs on these healthy giants. Gumosis so common in such cases, was totally absent. Then came a group of large peach trees uncared for in years

and gnarled with gumosis, to which worms had been applied. They are now cleared of their killing disease and covered in strong green shoots everywhere. And in only a few month's time! Strawberry beds wormed and mulched were possessed of mammoth berries, and vigorous large leaved plants. Yes, you'll read much and hear more, of the multiple good 'turns' that friendly earthworms are doing everywhere."

BRUSH DISPOSAL

Watch for announcement of a machine soon to be on the market, which will take heavy brush and grind it to chips. It will be an attachment for a tractor. All state highway departments could very well use them, instead of burning the brush. The resulting chipped organic matter could be given to the nearest farmer and gardener.

CORNCOBS

The July 1949, Chemurgic Digest says that corncobs may find another new use—as a filler in concrete construction, if studies being made by federal and state research workers in Michigan prove successful. It would be better if the agricultural department of the State of Michigan enlighten these concrete-minded scientists about the value of corncobs as a filler for the soil and tell them that the corncob has 2/3 as much nutriment as the corn kernel itself.

EGG SHELL POWDER

Here's an interesting self-explanatory letter, sent by Mrs. Helen Church of Chicago, Ill.:

"An old time family physician whom I used to know prescribed for bottle-fed babies finely pulverized egg shell powder, the amount equal to a grain of wheat in each bottle. The egg shells were thoroughly washed before breaking, then pulverized at Sargent's Pharmacy. Every child I knew brought up on that developed wonderful teeth.

"I use crushed egg shells to mark vegetable rows after planting and to mark bulbs which are to be moved after the tops die down. I also crush them and incorporate them in the compost where they seem to disintegrate.

"The zinc tubes of exhausted tooth paste are also finely cut up and put in the compost. Zinc and cobalt seem to be very important elements in nutrition."

MYCORRHIZA

Here is a sensational corroboration of the fact that the mycorrhiza fungus aides a plant in absorbing nutrients from the soil. I wish Sir Albert Howard had been alive to see this. The mycorrhiza works as a team with the roots on many food crops to feed the plant. Chemical fertilizers seem to inhibit the activities of this fungus. Read the *Agricultural Testament* by Sir Albert Howard. Here is the item from Science News Letter of July 16, 1949:

PROOF that fungi on plant roots help the plants in absorbing mineral nutrients from the soil has been written by the fungi themselves on photosensitive plates, in experiments carried out by Drs. Paul J. Kramer and Karl M. Wilbur at Duke University in Durham, N. C.

Many species of trees and shrubs, and some herbaceous plants as well, have the smaller branches of their roots densely covered with a fine weft of fungous hairs, known to botanists as mycorrhiza. It has long been assumed that mycorrhiza aid roots in absorbing water and minerals from the soil, but conclusive proof has been lacking.

Drs. Kramer and Wilbur prepared a solution of radioactive phosphate, and immersed in it the roots of pine seedlings, both with and without mycorrhiza. Then they laid the roots on photographic plates, separated from the plates only by a thin layer of aluminum foil. The radioactivity of the phosphorus recorded itself as bright outlines on the sensitive emulsion. Roots with mycorrhiza registered themselves much more strongly than roots without the fungous webs.

An illustrated report of the results of these experiments is presented in the journal, SCIENCE (July 1).

GREEN MATTER EXPERIMENT

We have completed our experiment

in producing compost without manure. It can be done effectively, but it is necessary to grind up the green matter. This can be done by mounting an old lawn mower onto a cutting board. It is described in the August, 1949 issue. If the green matter is shredded and earthworms are placed in the pile after the heating period is over, a good grade of compost will result enriched by the manure of the earthworms.

We made compost in two pits, but in one we added old compost to the green matter as we assembled it, in thin sprinklings. This compost heap was by far the better of the two. The material was finer and darker. This should be standard practice by all organiculturists.

MEXICAN BEAN BEETLE

We have excellent results in our vegetable gardens, as visitors will admit, but we have not yet conquered the Mexican Bean Beetle. Temporarily, we plant more than we need in this family, and share some with the Mexican. We still have four times more than we need, so why spray? Truck farmers, of course, have a different problem. What has been your experience with this fellow?

WAR

Here is a letter that poses a problem, for if this tendency should spread, there would be legal battles galore:

July 13, 1949

Mr. Frank Farnsworth,
Agricultural Department,
Columbus, Ohio.
Dear Sir:

On July 12, 1949, about 10 A.M. I had just taken the last head of cabbage from my garden to make sauerkraut. It made a washtubful of the nicest shredded cabbage I ever saw.

A man who told me his name is Mr. —— gave me a letter stating that a beetle had been found at a brick house not far from our place. The address given was Ed. Ulle, 156 Charlotte Street. The finding of this beetle was given as the reason for Agricultural men to spray our place which is about 300 feet away. I was told that any place within this distance of a beetle had to be sprayed.

I immediately got in touch with Mr. Porter who is stationed at the Cole Nursery place on Jackson Street, Painesville, Ohio, and told him of the incident. Mr. Porter came down and brought Mr. —— with him. Mr. Porter told me that the beetle was found at a white house which was more than 600 feet away on the property of Mr. and Mrs. Julius Kropac, 164 Charlotte Street, Painesville, Ohio. It impressed me as being strange that the information was not the same from the two men.

Mr. —— told me that if I did not allow him to spray he would call the Sheriff and threatened me about three times, and got very angry at me. I could see no reason for such actions, as no beetle was found at our place and I am in doubt now that there was any beetle found at all. We have the cleanest garden from the pests this year we ever had. Our peas were all gone in the month of June. We have been eating green beans since July 4, 1949. The Swiss chard was better than a foot high and all of this vegetable had been cut. We have one summer squash, lettuce, red beets—all from our garden and the only year we never had any beetles on the beans. The vines are so healthy with not a sign of a bug. The tomato plants are better than three feet high with two to three pound tomatoes on them.

We feel that it is because we use the organic method that the spray was forced upon us, and for spite. Mr. —— told me he would spray my garden for spite, and he sprayed.

I think you should have this information.

Yours truly,
(Signed) Ella E. Long.

ROOT HAIRS

"A single plant of winter rye can develop a root system of 14 billion hairs, with a total length of 6,000 miles," says a bulletin issued by the Milwaukee Equipment Mfg. Co. of Milwaukee, Wisconsin, makers of rotary tillers. But if grown by the organic method quite a few more billion

hairs will have to be added. This has been demonstrated many times.

SLUG SUGGESTION

A reader sprinkled sand around cabbages to discourage slugs. Claims it works.

GRAPE VINES

Gardeners, be food conscious. Put in a grape vine. No garden is complete without one. We have shown northerners how to have a fig tree, so that now you can fulfill the thought of the Bible, that each man should have his vine and his fig-tree.

CABBAGE MAGGOTS

In examining the stems of cabbages this spring we noticed at the ground line that there were many maggots but that they had died. Is there something in our soil, an antibiotic substance like penicillin, plus something in the plant which is raised organically, that prevents the cabbage maggot from living? Yes, the cabbages were excellent, heads extremely solid, without sprays.

Here is an interesting letter from one of our readers:

Mr. J. I. Rodale:

I am one of your subscribers, and completely in love with this idea of organic gardening. Somewhere, way back, perhaps in "Pay Dirt," you mentioned about cattle being able to sense the difference in pasture grasses, and practically always ending up with eating the un-chemically fertilized grass, (be sure and get that "*un*" in, in case this letter is published). Well, my dog can show you that in regards to raw or cooked vegetables.

I treat my dog very well, and try to feed her the same way. I have an egg and cereal with milk for breakfast, so does she, although not as regularly. If I'm eating watermelon, she gets some, and does she love it. For a dog, she has tasted a wide variety of foods, including green vegetables, among which are cucumber, celery, potatoes, carrots, peas, beans. She has had one carrot almost every day since we bought her, that's approximately six times 365 carrots. Quite a pile for a dog. But why, I ask you, when we have stew she'll manage to lick the gravy off the chunks of potatoes and carrots and push them out of her way. When she gets through eating stew, all you see left is a mess of potatoes and carrots, and she *will not* eat them.

But here's another angle: when I open a can of vegetable soup, she eats everything. Could there be a subtle answer in this which could bear investigation? Can it be that Campbells has access to better vegetables than we can buy for ourselves?

Sincerely,
Edward J. Skultin,
749 Highland Ave., Cambridge, O.

Editor's Comment: If you will examine the labels of many soup manufacturers today you will see the statement that Monosodium Glutamate is used to add taste to it. Is it possible that the taste of commercially raised vegetables has retrogressed that much that this has to be done otherwise no one would want to eat it. Monosodium glutamate is supposed to be a protein made from grain or vegetable matter, but who knows. If it comes out of a factory one should investigate further. So they put monosodium glutamate in to fool the dog. Perhaps that is why so much ketchup and condiments are being used today.

TOMATO DAMAGE

A news item from Texas:

HALLETTSVILLE, April 27.—Continued heavy rains during the past week have caused extensive damage to the tomato crop in this vicinity.

Many farmers have said their fields of tomatoes already have been lost, according to George Klimitchek, secretary of the local co-op. H. G. Timm, local tomato buyer, said he had heard reports most of the acreage in light sandy soils will show losses of 50 per cent or more.

A steaming process, created by the action of commercial fertilizer and excessive rain, was being blamed for scalding of roots and wilting of leaves, although some growers prevented losses by plowing or hoeing muddy fields immediately after the rains to prevent sudden reaction of the fertilizer.

J. I. RODALE

BOTANY FOR THE GARDENER (22)

By DR. WILLIAM H. EYSTER

FERNS

WE have already discussed in some detail the *algae* which live in water or on moist surfaces, the *fungi* which live as saprophytes or parasites on other organisms, the *liverworts* which are leaf-like plants that live in water or on moist shady surfaces, and the *mosses* which represent plants leaving the water and establishing themselves on the land. The algae and fungi are grouped together by botanists as the *thallophytes* or thallus plants, while the liverworts and mosses are usually referred to as the *bryophytes,* or moss plants.

Ferns are the First Real Land Plants

The ferns are the first real land plants as they have a well-developed anchorage and absorptive organ, the *root.* Ferns are known to many people, even to those who are not well versed in biology. Often they make up a conspicuous part of the plant life on the forest or woodland floor, or the shady banks of streams. Some species are used for planting home grounds while others, as the Boston Fern, are used indoors as pot plants.

The fern plant as we know it represents the sporophyte or spore-producing phase in the life cycle of the fern. The other phase in the life cycle is the gametophyte or gamete-producing phase which is described and illustrated in a following paragraph.

A few of our common ferns are illustrated in Fig. 62.

Parts of a Fern Plant (Sporophytes)

The plant body of our common ferns consists of a horizontal stem on or at some distance below the surface of the

Fig. 62 Ferns in their natural habitat

ground, fibrous roots growing out from the lower surface of the stem, and relatively large leaves commonly called *fronds*. As a general rule, only the leaves of our common ferns are visible above the ground. Externally the stem has the general appearance of a root and is called a rhizome. The tip of the rhizome and the bases of the leaves may be covered with brown scales called *ramentum*.

From the tip of the stem develop the new leaves which early in their development are rolled up like the end of a fiddle. For this reason, young fern leaves often are called "fiddleheads."

A fully developed fern leaf is differentiated into a petiole (stipe), a midrib (rachis), and leaflets of leaf lobes (pinnae). The leaves of most ferns are much lobed and divided, while those of a few are unlobed and undivided. The leaves have a well developed epidermis to serve as a protective tissue.

Some species of ferns have but one kind of leaf which carries on the work of photosynthesis and also, when the plant is mature, produces clusters of stalked sporangia (spore-producing structures) on its lower surface. A spore cluster is called a *sorus* (plural, *sori*). Sori of some common ferns are illustrated in Fig. 63. When mature the spores become brown in color so that the sori which are greenish when young become brown spots when the spores are ripe. Because of their brown color, the sori often are mistaken for rusts.

Other species of fern have, on the same plant, some leaves specialized for carrying on the work of photosynthesis (vegetative leaves) and others more or less highly specialized for producing the sporangia and spores. These specialized spore-producing leaves are called *sporophylls*. Common ferns which produce both vegetative leaves and sporophylls are illustrated in Fig. 64. The Osmunda ferns illustrate three kinds of sporophylls. The cinnamon fern (*Osmunda cinnamomea*) has the entire sporophyll modified for spore production, the clayton's fern (*O. claytoniana*) has a few of the pinnae in the middle of the leaf modified into

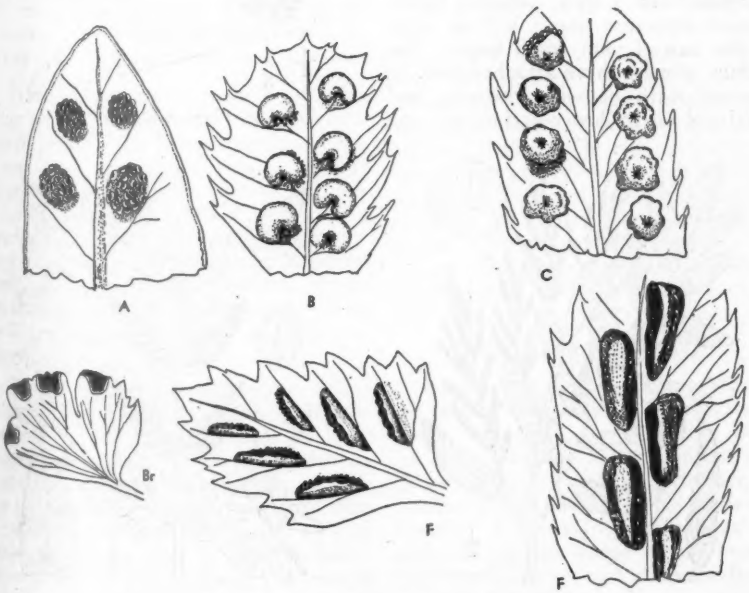


Fig. 63 Sori of Some Common Ferns.

spore-producing organs, and because of this interruption of the leaf is often called the *interrupted fern*, and the regal fern (O. regalis) in which some of the terminal pinnae are modified into spore-producing organs. Other common ferns with special sporophylls are the sensitive fern (*Onoclea sensibilis*), Adder's tongue fern (*Ophioglossum vulgatum*), and grape fern (*Botrychium neglectum*).

TREE FERNS

Ferns grow more luxuriantly in the tropical than in the temperate regions. Some subtropical and tropical ferns grow an upright stem and are known as tree ferns. The stem is covered with the bases of old leaves and bears a whorl of functional fronds at its tip. Tree ferns are sometimes grown as ornamental plants in conservatories.

The Fern Gametophyte

The spores shown in the sporangia in the sori drop to the ground and develop into gametophytes or gamete-producing plants as illustrated in Fig. 65. At first the young gametophyte resembles an alga, but gradually it develops into a thin, delicate, heart-shaped structure about half as large as the nail of your small finger. The mature gametophyte attaches itself to the soil with hair-like rhizoids, and produces on its lower surface the sex organs. The male sex organs (*antheridia*) are among the rhizoids near the older part of the gametophyte, while the female sex organs (*archegonia*) are near the growing point at the valley of the heart, as indicated in the labeled drawing, Fig. 65F.

Forest Ferns for the Gardeners

A general knowledge of our native ferns is easy to acquire. A vacation in the mountains or a walk along a woodland trail will bring you face to

Cinnamon Fern

Regal Fern

Clayton's Fern

Fig. 64

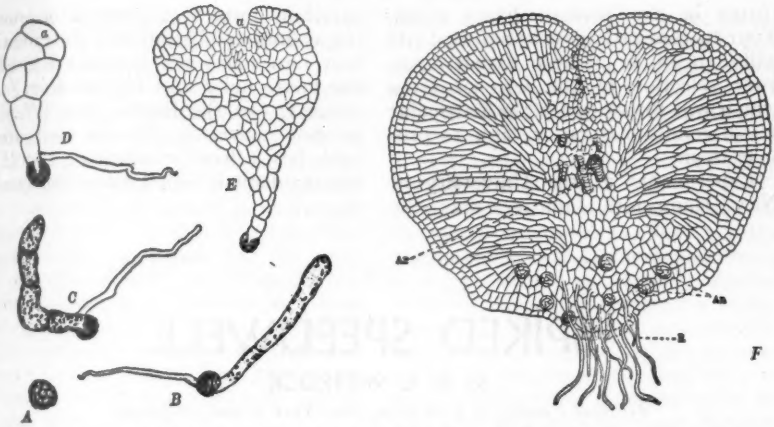


Fig. 65 Stages in the development of a fern into a Gametophyte. F represents a mature gametophyte with rhizoids and the sex organs (antheridia and archegonia).

face with many species which can be transplanted to the home grounds. With an inexpensive book on our native ferns, you can learn the name and some facts about most of them. Some, as *Polypodium vulgare*, grow on rocky bluffs, others clothe the sides of moist ravenes with their graceful beauty. Swamps and open pastures have their favorite kinds in profusion.

Native ferns are frequently the solution of a difficult planting problem. Such parts of the homegrounds as have deep and continuous shade, an unsightly stump or wall that defies concealment can be transformed into a garden highlight by a suitable grouping of ferns. Then also the delicate, soft, cool greens of the fern leaves make an effective background which will accentuate the lovliness of a choice group of flowering plants.

Ferns are easy to grow and adapt themselves readily to average soil providing a sufficient amount of leafmould is added. It is important to carefully observe each species of fern in its native habitat to make sure that it will succeed in the particular part of the garden you plan to plant in ferns. For a wet swampy place, you would choose the sensitive fern or ostrich fern but for a dry part of the garden, the osmundas, the aspidiums, or the evergreen Christmas fern might be selected.

With reasonable care, ferns can be transplanted at any time of the year, but they can be transplanted best in early spring or late fall. Clumps of ferns should be taken up with as much earth as possible and planted with as little disturbance as possible. Care should be taken to plant the ferns to the same depth as they grow in their natural habitat. Do not cultivate the ferns, but supply them with a liberal mulch of leaves of trees and decayed wood at all times. While most ferns prefer part shade, some species can adapt themselves to situations which have several hours of direct sunlight per day.

Ferns as House Plants

Ferns of one kind or another can be grown successfully in practically every situation in the modern home except perhaps in the sunniest windows. This is because ferns are by nature shade plants. The choice of species is necessarily somewhat restricted because those which require high humidity or cool climates during their periods of active growth will not

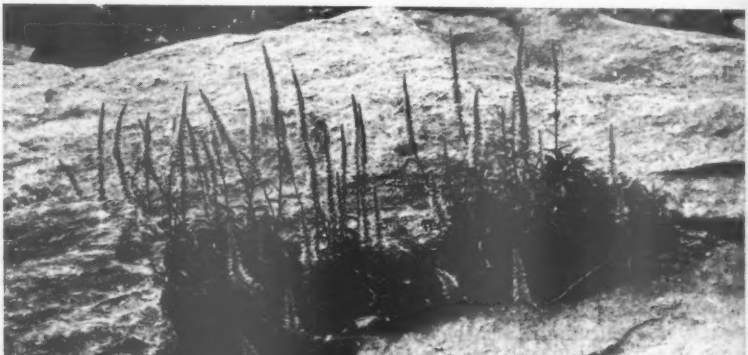
thrive in the modern living room. Your success with ferns as house plants will depend to a large extent upon your selection of the fern or ferns which will thrive under the particular set of conditions you are able to provide them.

Experiments at the University of New Hampshire indicate that the species of ferns best adapted for growing as house plants are (1) the rabbit's foot fern (*Davallia canariensis*), (2) the house holly fern (*Cyrtomium falcatum*), (3) the Boston fern (*Nephrolepsis exaltata*), (4) the variegated table fern (*Pteris ensiformis*), and (5) the maidenhair fern (*Adiantum cuneatum*.

SPIKED SPEEDWELL

By G. L. WITTROCK

Assistant Curator of Education, New York Botanical Garden



MANY of our garden plants have had their origin from some humble ancestor, either a wild plant from some obscure locality, a native of a local field or meadow, or even a lowly weed, so classed because of its persistence and its relative existence with civilization. Some of our horticultural floral friends today have been so changed with time, through culture and selection, that one becomes skeptical when told about their relationship to their native parentage. Other members of our gardens have not as yet been seriously changed by hybridization, and in many cases are still the original species as introduced from the native stage. The genus Veronica, the Speedwell, comes under this latter class.

The genus Veronica of the Scrophulariaceae or Figwort Family is listed with over 250 species, many are alpine in character; others make up part of our weed colonies, and still others are listed as most exotic, shrubby in character with handsome spikes of flowers, and often found under cultivation both for the foliage as well as the attractive spikes. In New Zealand the character of the species native there are alpine, 77 of which are distinctly endemic to those Islands. A

few species are small trees, but most are shrubby, while the herbaceous ones are found among the weeds.

The derivation of the name Veronica is not too clear since many definitions are given, handed down to us through the ages. The name appears in the Bible (Mark v. 25-34) and later was popularly explained as equivalent to the words "vera icon": true likeness. Linnaeus stated that the name is an alteration or corruption of Vetonica, from the Vettones, a people of Spain, but this becomes confusing and confounds it with Betonica. Lemery derives it from Ver: the spring. There is definitely a Roman female Saint named Veronica.

The species Veronica spicata is one of the European plants that we suggest as excellent for the Rock Garden planting. The species is known under many local names such as "Spicate-flowered Speedwell", "Spiked Speedwell", "Blue Spires", "Cat's Tail Speedwell", "Veronique á epi", "Aehriger Ehrenpreis", "Schwalbenzagel" and "Wiesenehrenpreis". The plants are found in hilly pastures, dry fields and sand dunes in middle Europe north to southern Sweden and Norway, west to southern Russia, Siberia and the Balkans. In England it is at home in dry chalky pastures where it blooms from July to September.

The plant is a perennial of an ascending or erect habit with rarely branched stems 1 to 4 feet high arising from short, creeping, almost woody rootstalks. The blunt leaves 1½ to 2 inches long are lanceolate to linear-lanceolate, wavy on the margin and downy hairy on the surface, often giving a grayish-green color to the foliage. The flowers are deep blue or pink forming a slender, erect raceme, 2 to 4 inches long, each flower being very small.

This species is regarded as one of the better Speedwells for Rock Garden plantings. It will clothe bare corners in either sunny or partially shaded positions, although it prefers a sunny exposure. The plants occasionally tend to sprawl; this is a characteristic, and little can be done other than to support the stems. Propagation is by seed sown in March or by root division from plants already established. Once established the care of the colony is of the simplest, since they are easily cultured. Many varieties are now to be had such as var. alba, a white form, 6 to 18 inches tall; var. corymbosa, 1 foot tall with blue flowers; var. nana, a dwarf from 6 to 9 inches tall with blue flowers; var. rosea, 15 to 18 inches tall with purplish-pink showy flowers; var. erica, a heath-like form with pink flowers; and var. rubra, an attractive variety with purplish-red flowers. The species or any of its varieties are always an attraction in any Rock Garden, since the narrow, colorful spikes and the grayish-green leaves of the colonies are always conspicuous in pleasant harmony with the other plant colonies near by and contrasting with the rocks among which they are planted.

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Organic Gardening is constantly striving to increase its subscription list. It is important that we tell as many people as possible about organic gardening. Perhaps you would like to take an active part in this important program by handing out our subscription booklets to friends, neighbors and acquaintances in your community. If you would like some extra money, this spare-time activity will return liberal commissions. The booklet will induce your prospect to subscribe. Through a coded coupon we can trace each subscription to your efforts.

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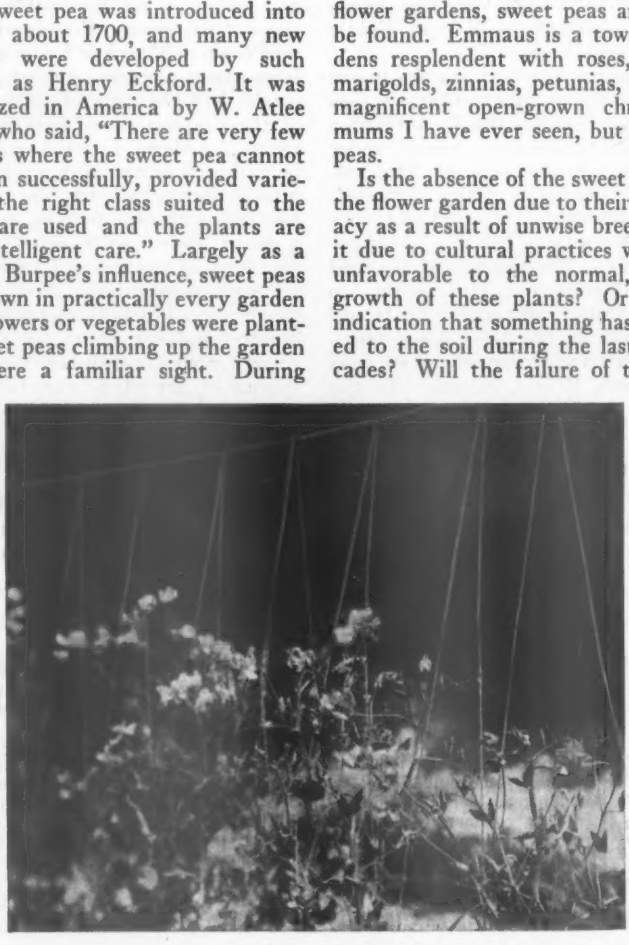
Sweet Peas Grow in Emmaus

By DR. WILLIAM H. EYSTER

THE Sweet Pea belongs to the Bean Family, and is a native of Sicily. It is one of the most highly developed and one of the most beautiful of all annuals. Not too many years ago the sweet pea was regarded by many as the Queen of garden annuals.

The sweet pea was introduced into England about 1700, and many new varieties were developed by such breeders as Henry Eckford. It was popularized in America by W. Atlee Burpee who said, "There are very few locations where the sweet pea cannot be grown successfully, provided varieties of the right class suited to the section are used and the plants are given intelligent care." Largely as a result of Burpee's influence, sweet peas were grown in practically every garden where flowers or vegetables were planted. Sweet peas climbing up the garden fence were a familiar sight. During the past quarter century these beautiful annuals have gradually disappeared from the gardens in many parts of America until today it is difficult to find a single planting in whole towns and cities. Even in towns where the inhabitants are especially interested in flower gardens, sweet peas are not to be found. Emmaus is a town of gardens resplendent with roses, peonies, marigolds, zinnias, petunias, the most magnificent open-grown chrysanthemums I have ever seen, but no sweet peas.

Is the absence of the sweet pea from the flower garden due to their degeneracy as a result of unwise breeding? Is it due to cultural practices which are unfavorable to the normal, healthy growth of these plants? Or is it an indication that something has happened to the soil during the last few decades? Will the failure of the sweet



Sweet Peas grown without Shredded Seaweed

pea to grow in our flower gardens be followed by the failure of other flowers in the future?

The "experts" seem to be in rather full agreement that sweet peas cannot be grown in our gardens under present cultural practices. According to the Woman's Home Companion Garden Book, "....Where the summers are hot and dry the flowering period of sweet pea is short and, unless ideal conditions may be given them, they are hardly worth growing." And according to the Practical Encyclopedia of Gardening, "Sweet peas are essentially cool weather plants, and they quickly fade away if the temperature persists for long above 75 degrees F. ....The plants must be well established before hot weather arrives, but if the heat is extreme and persistent, nothing will keep the plants growing vigorously, though it is possible to carry the plants through July and even later if a cheesecloth shading is erected over the plants."

Last year when I attended the Bio-Dynamics Conference in Spring Valley, New York I was amazed to find bouquets of sweet peas everywhere—in the lecture room, in the dining room, in the reception halls. They were grown by an organic gardener, but in Vermont. These compost-grown sweet peas, I learned, bloom profusely all summer long, in Vermont. Instinctively I wondered if I could grow sweet peas in Emmaus.

When I asked the president of a large seed company which formerly specialized in sweet peas why sweet peas are no longer grown in many American gardens where formerly they were so popular, I was told that root rot fungus made this impossible. He said that I might be able to grow the early-flowering varieties, but not the late-flowering garden varieties. At my suggestion he sent to me the varieties which he felt sure could not be grown in Emmaus.

Planting the Seed

In grading the grounds of a new home it was necessary to remove the topsoil from the area in which the peas were to be planted. The amount of surface soil removed in the grading operations varied from six to eighteen inches, leaving a heavy, yellow clay subsoil exposed and available for planting. There was no purpose in plowing or disking this soil. The soil for the

Sweet Peas grown with Shredded Seaweed

row of sweet peas was prepared as follows: A trench was dug in the subsoil twelve inches wide and twelve inches deep. This trench was filled with a carefully made and completely fermented compost. For covering the compost a composite soil was made by mixing together equal parts of the clay and compost.

Immediately after this trench was prepared, the sweet peas were sown in two parallel rows about six inches apart. The seeds were planted during the last week of March. When the plants were from four to six inches tall, a four-inch mulch of organic matter was placed outside the rows for a distance of about a foot. At this time also three stakes were set to which were fastened two wires near the ground and one across the tops of the stakes. Between the lower wires and the top wire, strings were woven to provide a support for the growing peas. That half of the row from which most top soil had been removed was treated with shredded seaweed from the coast of Maine, in addition to the mulch.

The Plants and Flowers

The part of the row which received shredded seaweed grew somewhat more vigorously and reached a greater height than the plants which were not treated with seaweed. The seaweed-treated plants attained a height of about four feet while the plants which had no seaweed grew to a height of three feet or less.

The first flowers appeared late in May, and the plants have been blooming more or less profusely since then and are still in full bloom in the middle of July. The part of the row which was treated with shredded seaweed is producing three to four times as many blooms as the remainder of the row. Also a goodly number of the stems have four flowers, while the untreated plants have only occasional stems with as many as four flowers. The flowers have been cut about three times a week to prevent the maturing of seed pods which results in the exhaustion of the plants.

The flowers are well formed and seem to have good substance. They showed surprising resistance to the continued exposure to a bright hot sun. Some flowers were highly fragrant, while others seemed to lack fragrance altogether. This difference as well as differences in flower color are the results of having planted about twelve different varieties in the two parallel rows.

The rainfall in Emmaus during June and the first half of July has been unusually light. Vegetables and flowers generally suffered from lack of water. The sweet peas endured this drought better than beans, cabbages, and other common vegetables growing in the same garden under identical conditions.

A duplicate and more extensive planting of these sweet peas was made on the Organic Gardening Experimental Farm with much the same results. The soil on this farm has been greatly enriched with compost during the past seven years. The sweet pea seeds were simply planted in drills and were not treated with seaweed. The vigorous growth and the free-blooming of the plants indicate that this soil contains sufficient humus and all the nutrient elements necessary for the fullest development and flowering of sweet peas.

Cultural Requirements for Sweet Peas

Sweet peas planted in soils low in humus and which have been treated with the highly soluble chemical fertilizers will not grow and bloom satisfactorily, as is pointed out by the garden experts. Such soils can grow plants only when soluble chemicals are supplied much as in the case of sand cultures. The sweet pea is a legume and requires enough humus in the soil to support the nodule-forming and nitrogen-fixing bacteria (*Rhizobium*) which make atmospheric nitrogen available to the plants.

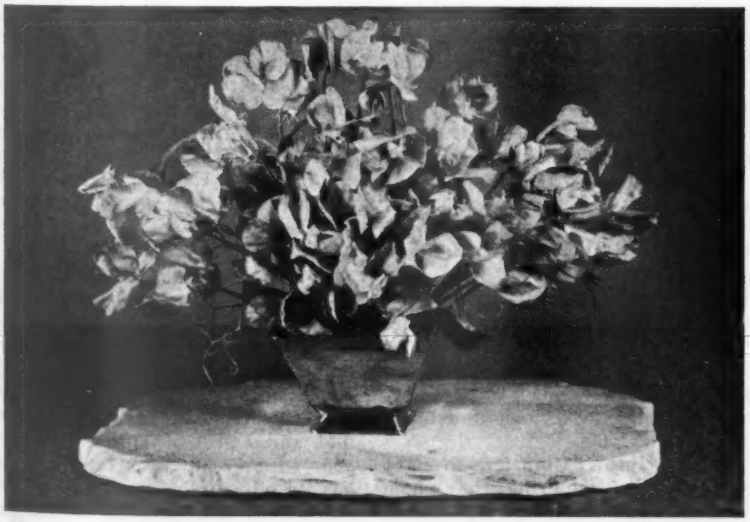
Sweet peas must have a well drained soil which is relatively rich in humus. They may be grown in the same soil year after year, as such soil will be richly inoculated with the proper nitrogen-fixing bacteria. It is important

that a well-fermented compost, not fresh manure or other raw organic matter be used unless enough time is allowed for the raw organic matter to be composted before the seeds are planted.

The more vigorous growth and the pronounced increase in the number of flowers of the plant which are treated with the shredded seaweed indicate that soils in which sweet peas fail may not only be low in humus but may be actually deficient in some one or more of the essential elements. Seaweed was used because it contains quite a number of the trace elements. No tests have been made to determine which elements in this experiment were deficient in the soil and provided by the seaweed. It is easily possible that in some soils certain elements may be lacking, in other soils certain other elements necessary for good growth and free blooming of sweet peas have been leached out of the soil.

Sweet Peas Grow Under Favorable Cultural Conditions

Sweet peas were common in the gardens throughout Pennsylvania and many other states when I was a boy. Evidently then the physical and chemical composition of the soil was favorable to sweet peas. Since then sweet peas have gradually disappeared until today it is difficult or impossible to find a planting of these queenly annuals in whole towns. Since sweet peas and the climate were about the same then as they are now, it seemed logical to me that the trouble must be in the soil and in cultural practices. The results of this test planting indicate sweet peas can be grown as successfully as any other annual *providing its cultural requirements are met.* Even in an unusually dry summer, they prospered and are blooming. The secret of sweet pea growing is in the soil. It is necessary to have good drainage, plenty of compost in a trench under the row, and have the presence in the soil of all major and minor elements including the elusive trace elements. Seaweed is like a shotgun treatment as it includes so many of the trace elements.



Courtesy of Burpee

An arrangement of June Lockhart sweet peas.

JERUSALEM ARTICHOKE

By EDWARD R. WALSHAW

THOUGH not very widely grown in the United States as a food plant, the Jerusalem artichoke deserves greater recognition, for it is a welcome addition to the early spring diet, when appetites are jaded and other plants have not yet begun to produce. Despite its name, it is a native to North America, being used as a food plant by the Indians before the coming of the White Man. Discovered growing in New England by early travellers, it was carried back to Europe, and soon spread throughout the Old World.

The Jerusalem artichoke may be prepared in a variety of ways. It may be cooked in any way that white potatoes are used: boiled, French fried, escalloped, etc. In flavor it is very delicate, being a pleasant change from the winter diet of potatoes. It is said to be exceptionally good for diabetics, since it is nearly free from starch and sugar. In some sections it is raised extensively as a stock food, under the name of *Girasol.*

The plant grows from five to eight feet in height, requiring the whole season to reach maturity. It bears a pretty yellow flower not unlike the sunflower, to which it is closely related. Many people have a clump or two of Jerusalem artichokes growing in their flower gardens, but are totally unaware of the edibility of the tubers.

Plant the tubers early in spring as soon as the ground can be worked. Jerusalem artichokes delight in a soil containing plenty of humus. The plant is a voracious feeder, as well as a heavy producer, yielding as much as four bushels of tubers to 100 feet of row, and seven to fifteen tons to the acre. So be sure that plenty of good compost is incorporated with the soil, or, failing that, rotted sheep or stable manure may be used as a substitute. Chemical fertilizers seem to have a scabbing effect on the tender skins of the tubers, and should be avoided.

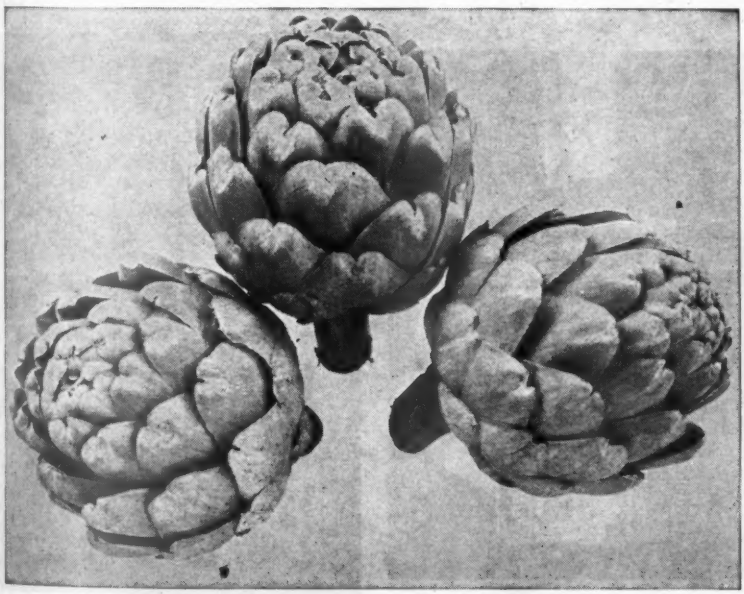
Plant the tubers eighteen to twenty inches apart in the rows, and have the rows at least thirty-six inches apart. Some people plant Jerusalem artichokes in a bed, leaving a few tubers for seed each year. It is a hardy perennial, and a bed so planted will remain year after year. While this method has its obvious merits, I like the row system, as one gets maximum yield and the tubers remain good-sized under cultivation. Artichokes left in the same bed for a long period of years

have a tendency to get smaller and to run out unless the soil contains plenty of humus. Plant them at the edge of the garden, where their great height will not shade smaller crops. Another use for them is to make a screen or hedge to hide an unsightly fence or outbuilding. Hill up the plants as in potato culture. Unlike the potato, however, the Jerusalem artichoke is almost completely frost proof, and the earlier it is planted the better. It requires from 120 to 130 days to mature.

In the Fall, after killing frosts have stopped growth, cut the tops off close to the ground. (These tops will prove a valuable addition to your compost heap.) Dig and store as many as you feel you will require during the early part of the winter. Unlike the white potato, the Jerusalem artichoke has a very thin skin, which is easily damaged by digging and handling, making it a very poor keeper in storage. The balance of the crop may be left in the ground. Frost does not harm the tubers, and the flavor is said to be improved if treated in this way. About two months seem to be the limit they can be kept in storage. In the Spring as soon as the ground has thawed sufficiently, the rest can be dug as needed; but be sure to save enough tubers to start a new bed.

There has been some confusion of the Jerusalem artichoke with another plant of a somewhat similar name, the Globe artichoke. This plant, however, had its origin in the Old World, and was introduced here many years ago. It is entirely different from our own native Jerusalem artichoke, and it is grown for the immature flower buds, which are the only edible part of the plant and which are considered somewhat of a luxury. The Globe artichoke is not suitable for the northern parts of our Country, as its ability to withstand the severity of our winters is very uncertain.

The Jerusalem artichoke has no insect enemies of any consequence, and this makes it a pleasant addition to the garden in these days of constant battling with pests.



Globe, French or Bur Artichoke

A Leaf Chopper

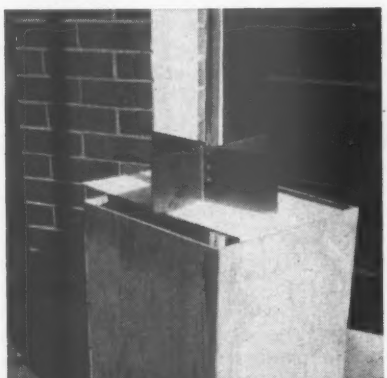
By BOYD E. DeLAMATER

SEPTEMBER, the leaf falling season, was at hand. I still had not devised a method for pulverizing leaves. For over a year I had tried to figure a way to do this. My garden was in need of trash to loosen the soil and also of the enrichment which the leaves would furnish.

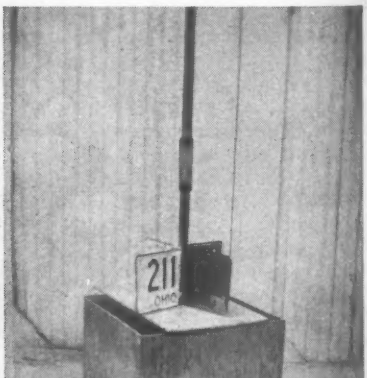
One Sunday morning I wandered out into the back yard, through the garden and finally into the garage. A few leaves were falling from near-by trees. Now, I thought, another year will go by and I still will have done nothing about chopping leaves for the garden. It was then that I noticed hanging on the inside garage wall some of my old automobile license plates. They might be used for a chopper.

Before the day was over I had my chopper. I took two of the plates, each twelve inches in length and five inches in width, flattened the bottom crimp, and filed to a sharp edge. Then I bent each one-half inch off center and to a ninety degree angle. This resulted in a six and one-half inch length one way and a five and one-half inch length the other and provided for a one inch overlap for the attachment of the plates to the squared end of a broom stick which I found I could use for a handle.

I then fastened the two bent plates to the broom stick with three small bolts, placing the broom stick one-half inch above the bottom edge of the plates. The result was a four blade chopper measuring twelve inches across each way as shown in picture marked "A." Since the chopper was somewhat light in weight, I fastened a five inch length of one inch diameter pipe over the lower portion of the broom stick handle, using two bolts to hold it in place. Then, not having a box into which I could place the leaves for chopping, I searched the basement and came up with an eighteen inch rectangular corrugated card-



A



B

board container, which I used temporarily.

Not many leaves had fallen and those that had were still somewhat green. I found, however, that I could chop them in the container to whatever degree of fineness I cared to, depending on how much effort I wished to expend. By the end of that September Sunday I had a small pile of pulverized leaves.

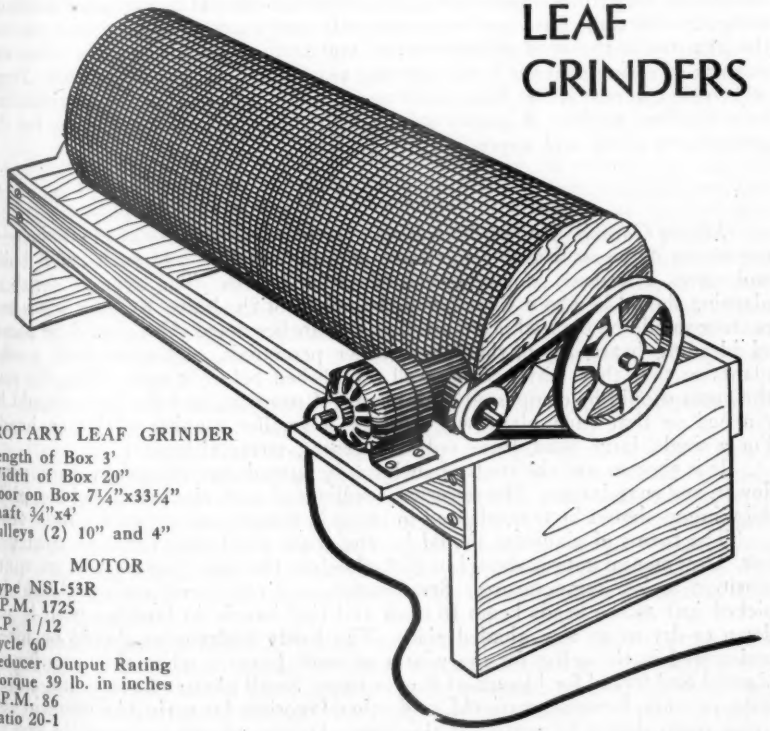
Sometime later I made another chopper similar in design and size but this time of one-sixteenth inch steel four inches in width. I also constructed a box eighteen inches by eighteen inches with a height of twenty inches. I lined the bottom of the box with cardboard. Both are shown in picture marked "B."

During the months of October and November I gathered and chopped leaves. During this period there occurred about three weeks of dry weather and I was able to gather leaves that were dry and brittle. This made the chopping much easier. Furthermore, in a near-by city park, I found leaves of small texture. These chopped even easier.

In the process of chopping about fifty percent of the leaves were reduced to near powder. I made small trenches in the garden, closely spaced, filled these trenches with the pulverized leaves and covered with soil. This spring and summer will determine what the results will be. Also I scattered some of the pulverized leaves around the strawberries in the strawberry bed to a depth of one-half inch.

I did nothing to my lawn but next season I expect to scatter and rake pulverized leaves as a mulch around the grass roots. Why not?

LEAF GRINDERS



ROTARY LEAF GRINDER
Length of Box 3'
Width of Box 20"
Door on Box 7¼"x33¼"
Shaft ¾"x4'
Pulleys (2) 10" and 4"

MOTOR
Type NSI-53R
R.P.M. 1725
H.P. 1/12
Cycle 60
Reducer Output Rating
Torque 39 lb. in inches
R.P.M. 86
Ratio 20-1

Garden Calendar — September

September may be regarded as the lookout month of the year in the garden, as the top of the growing and flowering season from which you can properly evaluate the worth of your garden. Has it been beautiful and colorful all season? Have you had an abundance of nutritious vegetables and fruits free from poisonous sprays? Have you had trouble controlling insects and diseases? Have you planted to provide color in your garden through the autumn months, and have you vegetables growing now for winter storage? During September and the following months millions of tons of leaves will fall to the ground. Many of these leaves are rich in minerals that have been absorbed from the lower levels of the soil. They should be composted and returned to the soil and thus maintain all essential elements in the soil in sufficient amounts to meet the needs of the plants. All garden wastes and all plant residues should be composted and returned to the soil. Then and only then will your garden equal or even surpass the pictures in the seed catalogs which you studied long before the rains and warmth of spring ushered in the growing season of your present garden. Properly made compost is free from weed seeds, and a compost-fertilized garden can be a weedless garden. A garden relatively free from weeds leaves time for the gardener to enjoy and appreciate his garden.

THE NORTH

Flower Garden. Do not delay longer the planting of bulbs of plants belonging to the narcissus family—narcissus, jonquil, daffodil—and such small bulbs and corms as crocus, snowdrop, chinodoxa, and scilla. The average depth of planting should be about three times the height of the bulb. Bulbous irises and peonies should be planted not more than two inches deep. Also should be planted bleeding heart, lily-of-the-valley, other perennials, and most rock garden plants so that they may become well established before winter. The chrysanthemums should be composted with plenty of compost, and the buds should be pinched so that each plant will produce a smaller number of larger heads. For a single, large head, leave only the center, terminal head.

It is time to sow the seeds of such hardy annuals as calliopsis, poppy, cornflower, and snapdragon. The self-sown seedlings of such plants as foxglove, pink, delphinium should be transplanted in the cold frames and grown for next year.

The corms of gladiolus should be dug when the leaves begin to turn yellow. Ornamental gourds should be picked before the first frost as they are quite sensitive to low temperatures. Strawflowers and other everlastings should be picked just as the heads begin to open and tied loosely in bunches with heads down to dry in an airy, shaded place. Non-hardy hydrangeas should be lifted and stored in the cellar for the winter or until January when they can be replanted and forced for blooms at Easter time. Small plants of geranium, calendula, petunia, begonia, marigold, and other favorites for early blooming in the living room should be potted at this time. Dahlias should be carefully staked

and fed with compost. Some of the buds should be pinched out so that a smaller number of more perfect and larger heads will be formed.

Lawn. This is the best time of the year to make a new lawn and to reseed the bare spots in an old lawn. Continue raking and cutting the crab-grass to prevent it from seeding. Finely sieved compost is the best lawn fertilizer.

Shrubs and Trees. Deciduous hedges should be trimmed for the last time this season. September is the best time to move conifers. Deciduous shrubs and trees should be transplanted when their leaves begin to assume their autumnal colors. In transplanting holly, half of the leaves should be removed.

Vegetables. Radishes, spinach, lettuce may be sown in the coldframe for early winter us. Parts of the vegetable garden from which the crops have been harvested should be seeded with winter rye, vetch, or other hardy cover crop to be worked into the soil and converted into humus in the spring.

Fruits. Grapes must be picked before they get soft and allowed to complete the ripening process in a cool, dark place.

THE WEST COAST

Prepare the garden for the winter rains by removing all plant materials and rubbish and put them in the compost heap. Work into the surface layer of the soil a liberal application of compost at this time. By so doing you will provide food for the soil organisms and maintain your soil in a living condition.

Flower Garden. For winter flowers, sow seeds of sweet pea, petunia, violet, pansy, nasturtium, lobelia, larkspur, and calendula. Transplant seedlings of annuals and perennials previously sown. Make cuttings of hydrangea, salvia, fuchsia, petunia, heliotrope, evergreens, privet, cotoneaster, myrtle, rhododendron, evergreen veronica, and rock garden plants. Plant irises and amaryllis.

Lawn. Follow suggestions for the North.

THE SOUTH

Flower Garden. Give the roses a liberal feeding of compost to aid fall blooming. Plant small bulbs as indicated for the North. Peonies should be planted but use northern grown plants as southern grown plants are not yet dormant. Do not cover the roots with more than two inches of soil. If planted too deep, peonies will produce too many leaves and too few flowers. Sow seeds of perennial flowers for next year's flower garden. Plant sweet pea, a favorite flowering plant in this section which grows luxuriantly and to a great height. Other flowers for September include African violet, Shasta daisy, nasturtium, pansy, petunia, phlox, carnation, ageratum, hollyhock, marigold, salvia, snapdragon, and dianthus.

Lawn. Give the lawn an application of finely sieved compost and reseed the bare places. For a winter lawn, sow Italian ryegrass.

Vegetable Garden. This is the time also to plant garden peas, tender beans, and most other vegetables except corn and melons. These foods will be ready for harvest before frost is likely to occur. Potatoes do best when well covered with a thick mulch of grass or other plant material. Mulching will not only produce a better crop but serve to protect the plants from a possible frost. In case your celery has not already been started, plant now, preferably under shade. The low muslin tents used by the commercial growers afford the best protection from excessive sunlight.

Water Hyacinth Mulch. Florida gardeners who have access to the lakes and rivers, or even small ponds, in which water hyacinths grow in such profusion can easily add to the green matter for the compost heap or for direct application to the surface of the soil as a mulch. Allow the water hyacinth plants to wilt before using them in the compost heap.

THE LOWER SOUTH *

Flower Garden. One of the most satisfactory flowers is the hibiscus, of which there are so many colors. Slips are easily started and grow rapidly. Other flowers: Ageratum, alyssum, African daisy, aster, baby's breath, bachelor's button, balsam, blue lace flower, calendula, candytuft, calliopsis, carnation, Chinese forget-me-not, Shasta daisy, dianthus, gaillardia, strawflower, lupine, nasturtium, pansy, phlox, California poppy, petunia, Queen Anne's lace, salvia, scabiosa, snapdragon, sweet pea, statice, verbena, periwinkle.

Vegetable Garden. Asparagus, though more suited to a northern climate, is well worth planting in Florida. The principal drawback is that in this climate asparagus does not recognize any dormant season, but persists in growing the year round; consequently the stalks are not as large as they would be if the growing season were shorter. The small, tender stalks are excellent in salads, raw, and sufficient for this purpose may be obtained for a long time, before the main growth comes in the spring. Other vegetables to plant this month are: bush beans, beet, broccoli, Brussels sprouts, cabbage, Chinese cabbage, carrot, cauliflower, celery, collard, cucumber, endive, garlic, kale, kohlrabi, leek, lettuce, mustard, okra, onion seed and sets, parsley, parsnip, garden peas, potatoes, radish, rhubarb, romaine, rutabaga, spinach, squash, Swiss chard, tomato, turnip.

Trees and Shrubs. If not already on the place, pecan trees should have a corner somewhere. They are well adapted to Florida. Give them plenty of room, as the pecan eventually grows into a very tall tree. After being well established they are seldom injured by frost.

NOTE: Anyone in Central Florida who is making a success of raising thornless Boysenberries will confer a favor on this department by writing to the undersigned. If the reader who inquired sometime ago about Honduras lilies will forward name and address, the information requested can now be supplied.

THE SOUTHWEST **

If you are going to be a successful gardener in California, you must learn first of all you cannot plant any month in the year. We have two distinct planting seasons; the Spring when the days are growing longer and the Fall when the days are growing shorter. September ushers in our "second Spring" when we do the bulk of our planting for the vegetables which mature in the winter and the flowers which come into bloom from December until March and April. Do not be deceived by the high daytime temperatures during August and September. The night temperatures are your control and when they go down to 40° F., the dormant period sets in.

Flowers. By the first of September your ground should be thoroughly watered and properly prepared. Set out from flats, seed beds and plant bands, the winter annuals which you have had coming on since June and July, giant imperial stocks, calendulas, tetra-snapdragons, Primula obconica, Primula malacoides, cenerarias, forget-me-nots (Blue Bird), Iceland poppies, pansies and violas. Deep rooters such as larkspur, poppies, flax, are more vigorous if planted where they are to bloom. The golden African daisy broadcasted will give you sheets of color in mid-winter. Many perennials such as delphinium, columbine, geum, Shasta daisies, rehmania, coreopsis and pentstemon make wonderful root growth during the winter season and are much better than the division advised at this time.

Many bulbs should go in immediately with the beginning of the planting season. It is the last call for Lilium candidum. Deciduous watsonias, freesias, baby gladiolus, leucojums, paper white narcissus, Chinese sacred lily, Soleil

* Edwin H. Abrams, 1017 Lakeshore Boulevard, St. Cloud, Florida
** Charlotte M. Hoak, 1125 Stratford Ave., So. Pasadena, California

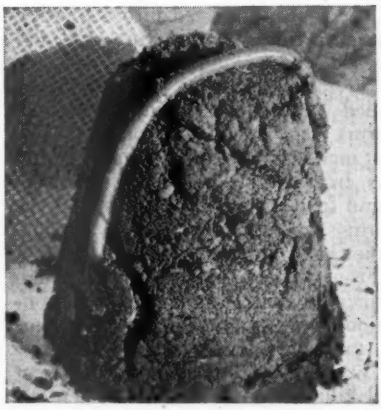
d'Or, Scilla campanulata, bulbous iris, ixias, sparaxis, grape hyacinths and native bulbs are better if planted early. The first planting of ranunculus may be made in September.

Trees and Shrubs. Unless you are equipped to give them adequate care, trees and shrubs should not be planted to combat the scorching suns of August and September. Hold off on watering for your avocados, citrus trees and all subtropical ornamentals, so as not to force out new growth to be caught by the frost. Watch your azaleas and camellias, being careful that they do not dry out at any time. Overhead sprinkling increases humidity on hot dry days when there is danger of foliage burning.

Vegetables. Rush your winter vegetables in. Sow in double rows, seeds of carrots, beets, chard, early onions (Crystal Wax and Early Red), winter radishes, Chinese mustard, Southern curled mustard, parsley and turnips. Beets, chard and carrots come up better if soaked in hot water before planting. French breakfast radishes may be used as a nurse crop for carrots. In mild locations, Canadian Wonder Bush Beans and Pencil Pod Wax Beans come on by the second week in November if put in the first week in September. Chinese peas may be planted the last week of the month. Set properly spaced, in single rows, strong plants of early cauliflower, Italian sprouting broccoli, Copenhagen market, Savoy and red cabbage, kale and celery. Onion sets and onion seedlings, Los Angeles market and Romaine lettuce, broad-leaf endive, may be set out in double rows. Kohlrabi makes a good substitute for turnips; Chinese cabbage is a doubtful crop for the average home gardener and spinach takes too much room.

Freezing of Earthworms

By J. A. JOHNSON



IN the summer of 1947 there appeared an article in a very prominent and largely read Garden Magazine, quoting two U. S. D. A. scientists, Henry Hopp and Homer T. Hopkins as saying that earthworms will freeze very quickly in the fall before they can channel down into warmer regions.

Since we believed that nature would not again destroy wantonly one of its most beneficial and ardent mediums for the replacement of topsoil, and that we were again faced with the old bugaboo of the bird getting the worm, thereby killing off its numbers, two experiments were decided on to find out what happens to earthworms subjected to frost and freezing temperatures.

The first experiment involved use of mechanical means in creating various temperatures from freezing to 40 below zero. A box 17"x14"x6" (the same size as that used for propagating worms in a hatchery) was insulated on the sides and bottom with 8" thick cork insulation, leaving the top open to simulate as closely as possible a top surface of outdoor soil where frost will first begin on the surface, then go downward. Several experiments at various temperatures were made. Each time 100 worms were used and the soil was held at a temperature of 40 to 42 degrees when each experiment

began. For each experiment worms were placed in all parts of the box, not over a half inch from the top, and 10 worms were scattered on the top surface.

The first box was placed in a room having a temperature of 28 degrees for one hour. No worms were found frozen, and all were at the bottom of the box.

The second box was placed in a temperature of 10 degrees for one hour. Same result; no worms frozen.

The third box was placed at zero for one hour. One worm was found frozen on top.

The fourth box was placed at 6 degrees below zero for one hour. Eight worms were found frozen on top; all the rest were at the bottom of the box.

These four boxes were placed in a room where the air was absolutely calm and in each instance taken from an outside temperature of 46 degrees.

For a supreme test, a fifth box was prepared, but 25 worms were placed on the top and shoved into a freezing tunnel having a temperature of 40 degrees below zero and a wind velocity of 30 miles per hour. The box was pulled out after 20 minutes and 23 worms were found dead on top. The first inch and a half of soil from the top was frozen solid and 9 worms were found frozen in it. The balance of the worms were found at the bottom, somewhat sluggish but alive.

From this experiment, even though rtificially made temperatures and conditions were employed, a lesson seems to stand out: that worms will burrow to warmer surroundings before frost will kill them. It was only when the temperature was lowered too quickly that any frozen worms could be found. The second experiment was made in the open and as near to nature's way in freezing soil as it was possible to make it.

In January, 1948, a regular breeding box containing approximately 1500 worms was taken from the hatchery, emptied into a hole in the garden, and covered with a half inch of soil. In two weeks time there was a four inch frost in the ground. The frozen layer of soil was removed from its experimental place and thawed out, but no dead worms were found. As we dug deeper, numerous worms were found and by excavating under the frozen soil surrounding the hole, worms were found to have burrowed away from their original placement.

A small cold frame was selected for a tryout on worms freezing in the open. Four boxes of worms with their culture were emptied in half of this frame. During the day the glass would be kept in place, but removed each night. Every morning when it had been cool enough to make a layer of frozen soil over the night, the layer would be removed, thawed out and searched for any dead worms, but after two weeks none had been found.

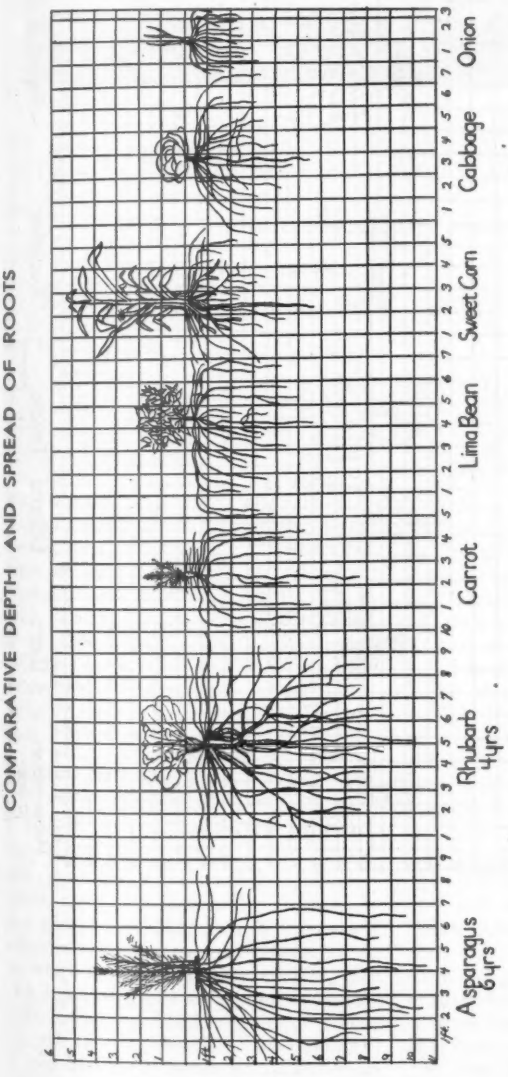
In this last experiment, numerous capsules (worm eggs) were found frozen. These were saved each day and kept frozen until 80 had been accumulated. These 80 were placed in two boxes of culture with 40 capsules in each box. The boxes were placed on February 21, 1948. On March 29th they were opened for inspection and in each box were found 25 newly hatched worms. They were removed and the boxes again placed for further incubation as several capsules had not been hatched.

On April 25th the boxes were again opened and inspected. In one box 14 and in the other 17 newly hatched worms were found. The boxes were again placed for a further incubation and opened on May 22, when 15 and 19 newly hatched worms were found. There remained only 4 unhatched capsules in one box and 5 in the other, and the experiment was not considered of any further value as the remaining capsules were shrunken and seemingly dead.

The foregoing experiments were carried out with worms which were bred and raised under controlled soil and food conditions. This winter we wanted to continue our experiment with worms found in the ground, but the weather has been so mild that the prospect has been given up for this year.

ROOT SYSTEMS OF VEGETABLE PLANTS

By DR. PAUL SCOTT



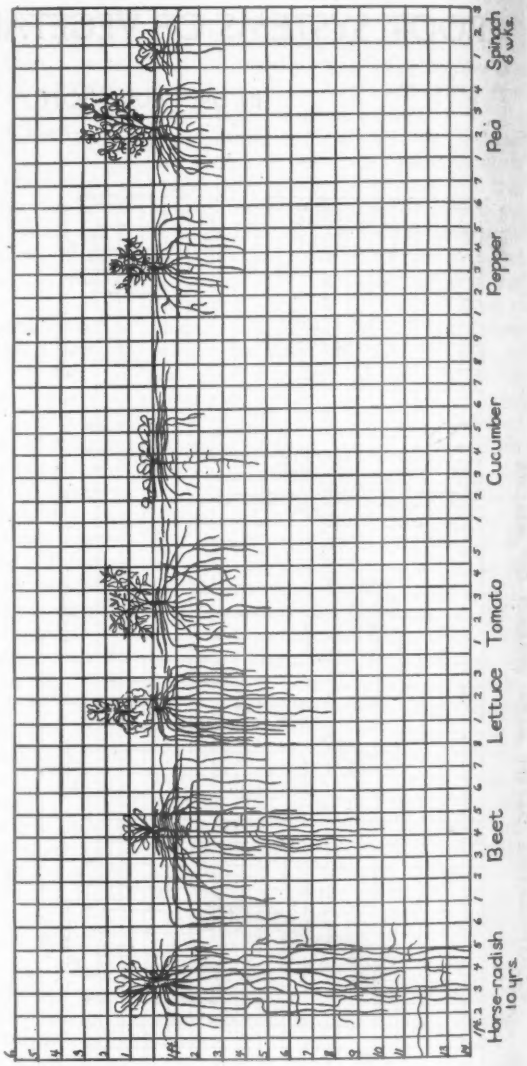
A VEGETABLE plant is a food factory made up of an underground part called the *root system* and an aboveground part called the *stem system.* Vegetable gardeners are thoroughly familiar with the stem system consisting of one or more stems which bear leaves and eventually produce the flowers. The flowers ripen into fruits containing the seeds.

The root system of vegetable plants is little known by gardeners. This is natural enough as the root system is underground and its nature can be learned only by carefully removing the soil and following through the soil the main root and all its branches. A comprehensive study of all the common vegetable plants was made by Weaver and Brunner. Their results are given in their book, "Root Development of Vegetable Crops," (McGraw-Hill Book Company, New York, New York), now out of print.

The relative extent of the stem system as compared with the root system of some of our most common garden

vegetables is indicated in the diagram accompanying this article. In the diagram, the ground level is indicated by a heavier line. The horizontal lines above this line represent feet to show the height of stems, while the lines below represent feet to show the depth to which the roots penetrate the soil. In asparagus, for instance, the stems when mature reach a height of about four feet while the roots penetrate the soil to a depth of some ten feet. Or in horse radish the stem and leaves are hardly more than 1½ feet while the root extends fifteen feet into the soil.

It should be noted also that the feeder roots extend parallel and close to the surface of the soil, thus indicating with what care cultivation must be done. Deep cultivation is almost certain to damage some of these roots. This can be prevented by maintaining a mulch on the soil. A suitable mulch prevents the growth of weeds, conserves moisture, regulates soil temperature, and provides food for the soil organisms which play an important role in preparing the nutrients which are absorbed by the roots of the vegetable plants.



How to Have Plenty of Phlox and Bleeding Hearts

By JULIE BEDIER

THE good old fashioned Bleeding Heart (*Dicentra spectabilis*) is loved by everybody and its delicately poised sprays of rose and white hearts are one of the heart warming sights of early spring. In spite of its hardiness, dependability, and freedom from pests, hardly anyone seems to have more than one or two clumps of this lovely flower. There is no reason why anyone with one clump should not have fifty, if he wishes, so that his early garden will be a picture to remember and his house may be decorated with vases of dangling hearts to his own heart's content.

Seed grown Phlox Revert to Magenta

Perennial Phlox is another old faithful, hardy and reliable and worth having in large quantities. However, there are phlox and phlox. There is the gorgeous thoroughbred in scarlet, salmon, crimson and tints; some come in white calico with rose eyelets, like the starched glory of the farm housewife expecting Sunday guests. These elegant thoroughbreds do well enough, if you bed them down in almost pure compost, give them plenty of room, and demolish any rivals to their place in the sun. But if you do not coddle them they are likely to pine away into spindling little souvenirs of themselves. Their self-sown seedlings, on the contrary, spring up with the hardiness and vigor of the mongrel, quite unashamedly revert to type and bloom in blowsy magenta. These large healthy plants soon crowd out the dainty aristocrats, and some people, not knowing what has happened, say "The plants changed color."

The remedy for this sad state of affairs is to try to prevent your good phlox from going to seed. But since they will get ahead of the most vigilant gardener sometimes, the thing to do next is to take up every plant of magenta as soon as it blooms. Dig it up with all its roots, for the pieces of root left in the ground will grow again. Then dump a basketful of compost into the hole, and plant phlox there. How to get good phlox without constantly buying new plants? The same process holds for phlox and for bleeding hearts, and around November is the time to start.

Maintain the Type with Root Cuttings

"The pieces of root left in the ground will grow again." There is the clue. If they will grow left in the ground, they will also grow if put into the ground where you want them. If you have a clump of good phlox whose color pleases you, dig it up carefully with all its roots, (the same process applies to bleeding hearts), soak or gently wash the soil away. Then take scissors or clippers and cut off pieces of root 1½ to 2 inches long. You can get an amazing number of pieces from a good plant, phlox or bleeding heart. Take a flat or wide shallow pot and fill to an inch of the top with a mixture of sifted leaf mould and sand, half and half by measure. Strew your phlox root cuttings around on top of this mixture, then add half an inch or more of the same mixture, enough to cover the roots well. In the case of the bleeding hearts, since their roots are apt to be larger and more fleshy, you may cut or break them into fair sized pieces and plant them in the mixture, covering over with the same. All this is done in the late fall.

Propagating Pit

You should have a propagating pit, which is simple and easy to make. Dig a pit about two feet deep and as wide and long as you like—merely big enough to accommodate your pots or flats. If on the sunny side of a building, you will want to open it up earlier in the spring than if it is on the north

side. At any rate it should be lined with ¼ inch wire mesh to keep out the "varmits". It should have in it some soft bedding material like leaf mould, peat moss or sphagnum moss. This retains moisture and serves as insulation, insuring an even temperature. Nest your pots or flats down snugly in this hibernating hole until the bedding comes up to their tops but not over them. Put another piece of wire mesh on top, closing all cracks and crevices. Then cover the wire "lid" with four or five inches of excelsior or leaves, and if there is no rain give all a good watering. Before hard freezing weather or deep snows set in, cover your pit with burlap bags full of leaves or in some other effective way. The contents of the pit should be cool, but not frozen, damp but not wet, and of course they must not get warm on sunny winter days or they will sprout too soon and perish.

Coldframes

Early in spring open up your pit and take a look. Perhaps your pots may already be sprouting numbers of young pale yellow shoots. In that case replace only some of the excelsior or leaves, so a bit of sun and air can get in. Or if you have a cold frame, place the containers in that until the shoots are green and hardy. As soon as the weather is settled you can transplant your quantities of young phlox and bleeding hearts to individual plant boxes, tin cans or pots, for easy summer placing in the garden. If you prefer you can grow them in a small nursery bed until next spring. At any rate plant them in soil rich in compost and stand back and rejoice in the numbers of beautiful plants you have produced.

The parent phlox from which the roots have been shorn can be replanted in the garden. Plenty of compost, and soaking with a transplanting hormone solution will encourage it. The operation, of course, does not improve it any, but it will recover and go on blooming cheerfully each year. The offspring of course are identical, which is not the case with phlox from seed.

The Soil and Health Foundation

Compost-making is in its infancy in this country. During the past number of years experiments in composting, based on Sir Albert Howard's Indore method have been carried on at the Organic Gardening Experimental Farm. In the laboratory of the Soil and Health Foundation new experiments based on extensive researches in Italy are being set up. According to the published results in Italian publications, compost made in silos under carefully controlled conditions is richer in plant nutrients than the compost made in open heaps and pits. These experiments involve the study of the dimensions of silos, methods of filling and emptying the silos, and the development of specific organisms for particular kinds of materials used in the composting. The initial results are so promising that the Foundation studies may revolutionize the making of compost and design inexpensive farm-size silos to enable a farmer to manufacture his own fertilizer from plant and animal residues and such natural products as pulverized phosphate rock, pulverized glauconite or feldspar, shredded seaweed, and similar natural materials containing nutrient elements.

46 South West St.
Allentown, Pa.

Seminar on Compost—When to Make It

THE best time to make compost in the temperate climate is in June, because the warm weather of July, August, and September, makes organic material decay faster. In sub-tropical climes make it anytime. In the north, however, you often have extremely dry summers, when the decaying process is held up. We recently made a pit of compost of very resistant ingredients—shredded corn cobs and leaves—in the middle of the winter, and by July it had been turned into wonderful compost, using earthworms to do the mixing. If the compost is made in a pit, in the winter, the pit-sides keep it warm and accelerate the decay processes. It wouldn't pay to assemble a compost heap in the open, in the winter. In the winter compost can be made during the warm spells, in pits.

Winter Time Compost Making

For winter composting, pile up the manure with a covering of soil and burlap bags or canvas. Also have available in a protected place top-soil and green matter that are not frozen. Leaves that have been gathered in the fall are excellent.

If you do have to make a compost in the open during winter, choose a protected place, as on the south side of a building or wall. You could also make a protective barrier of corn stalks tied together. An extra heavy layer of soil on top would help, or a very heavy hay or straw-mulch a few feet thick to keep the heap warm.

October and November

These months are excellent for making compost heaps or pits because at no other time of the year are plant materials more abundant for this purpose. Garden wastes, autumnal leaves, roadside weeds, wastes from food-processing plants and other materials are easy to obtain at this time of year. Also by making the compost heap now, the compost will be ready for use at spring garden making time.

TIME FOR COMPOSTING

Q. It seems my compost does not get ready in time. Does that matter?

Utecht, Jackson, Fla.

A. As to the question of compost, it varies very much according to what has gone in originally. Some people get smooth compost, *crumbly like the humus of an old garden* rich in organic substance, others have *stringy material* when the time is over. So much depends on what earth has gone into the heap, how rich it was in old bacterial life, etc. But on the whole, it seems, if we can judge from the enormous correspondence on this subject, such compost is quite suited to being put in the soil; if it should not be fully matured the remaining stage can well take place under ground.

If you intend to have more heaps this year, you might give them a bit longer for the first stage of breaking down under the influence of heat and air; that will probably be wise for a more northern climate. Be sure that the heaps are moist and shaded!

COMPOST-APPLICATION

Do not apply compost during the winter. A factor in determining when to apply it is the condition of the compost. If it is half finished, or noticeably fibrous it could well be applied in October or November. By spring it will finish up in the soil. Otherwise the ideal time to apply it is a month or so before planting. The closer to planting time the more it should be ground up or worked over thoroughly with a hoe to shred it fine. A garden cultivating tool like a Roto-tiller will spread it evenly in the soil, and mix it thoroughly with the soil.

If your compost is ready in the fall and it is not intended to be used till the spring it should be kept covered and stored in a protected place. If it is kept for a long period in the summer,

the finished compost should be watered from time to time.

HOW TO APPLY

The soil should be stirred up thoroughly. Then the compost is applied to the top four inches of soil. For flower and vegetable gardening it is best to pan the compost through a half inch sieve. Coarse stuff is then put into another compost heap. Never use compost as a mulch. Always dig it into the top three or four inches of soil. It is best not to add compost when the plants ae growing as this will injure plant roots growing near the surface. If you have some compost that you are set on applying to a growing crop, mix it first thoroughly with topsoil and sand and then use it as a mulch. Use twice or three times as much soil as compost.

HOW TO APPLY COMPOST IN A GROWING CROP

In order not to disturb the roots of growing crops by digging in compost while the plants are growing, the compost could be mixed with top-soil and together applied as a mulch. Compost by itself on the surface will dry out and lose nutriments.

COMPOST—HOW MUCH TO APPLY

In gardening for best results, for spectacular results, the compost should be applied extra heavy, let us say from one to three inches in thickness per year. In four or five years with such applications your garden will become one of the wonders of your neighborhood. Of course you can get by with even a half inch of compost, but in gardening with small plots, put it on heavy. There is no danger from burning due to overuse. A plant can grow in pure compost.

You can apply compost once or twice a year. The amount would of course depend on the fertility of your soil to begin with.

WEIGHT

An average figure of weight for one cubic yard of compost (27 cubic feet) is 1,000 pounds. There would be a variation based on materials used.

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Anna Frost—Large semi-double, clear pink to light red, semi-double. Midseason.
Alba Plena—Very double, snow white. Extra early.
Auguste Delfosse—Large, clear rose, tips light purple. Midseason.
Bella Romana—Large double, light rose, splashed with red. Midseason.
Bonnie Bee—Semi-double, red Midseason.
Brilliant—Full double, brilliant red. Midseason.
Brooklyana—Very double, medium size, pink mottled white.
Brown's Red—Semi-double, dark red. Late.
Clark's Red—Double red, very large. Early.
Chandleri Elegans—Very large, peony type, cherry red with white variegations. Midseason.
Cameo Pink—Full double, large, light pink. Midseason.
Cherokee—Rose and white variegated.
Cliveana—Medium size, thick peony type, solid deep pink. Late.
Colonial Pink—Peony form, deep pink.
Countess of Orkney—Very double, light pink striped red. Early.
Candidissima—Imbricated, white.
Caleb Cope—Coral pink, full double, all season bloomer.
Cheerfulness—Full double, deep rose. Midseason.
Dark Cheerful—Full, double rose. Midseason.
Dixie—Large, full double, vivid pink. Early.
Elizabeth—Very double, pure white, crinkled petals.
Mission Bells—Rose with golden stamens.
Mrs. Abby Wilder—Peony form, medium to large, white slightly splashed pink.
Oriental—Midseason deep red, peony form.

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1½ to 2 feet	1.25 each
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Americana—Pale pink striped, imbricated. Midseason.
Austill Pink—Semi-double pink, medium size. Midseason to late.
Abundance—Large white, semi-double. Midseason.

RARE CAMELLIAS (Cont'd)

Adolphe Red—Very large red, veined purple, semi-double. Midseason.
Amabilis—White, large single. Early.
Aurora—Large rose madder, prominent stamens. Midseason.
Althea Flora—Late, semi-double red.
Akebono—Early semi-double salmon-pink.
Akebono Variegated — Semi-double salmon-pink and white. Midseason.
Arajishi (Aloha)—Early, peony-type, similar to Prof. Sargent, red.
Aspacia—Large variegated Emperor of Russia, semi-double red with white blotches. Early.
Admiration—Large, imbricated to peony-form, red marbled with white. Midseason.
Adolphe Audussen—Large, double, bright salmon-red.
Alba Superba—Large, semi-double, white.
Amazing—Carmine, lightly washed. Midseason.
Amabilis Variegated—Medium size flower, single light rose with deep rose stripes.
Admiral Nimitz (Kishu Tsukasa)—Large, pink with an occasional petal mottled with white. Midseason to late.
Aitonis—Large, semi-double to single rose-pink.
Angela Cecchi—White marked with red, stripes of pink. Early.
Anna Luchini—Variegated rose and white, semi-double. Late.
Beaute de Nantes—Large red, semi-double. Early.
Belle Jeanette—Light purple, dashed with white. Midseason.
Bonomiana—Variegated rose, washed with white. Early.
Bella Romana—Large, double light pink to rose, striped and splashed with deep pink and crimson. Midseason.
Brassennis Variegated—Full double. Late.
Beautiful—Light purple splashed with red, peony type. Early.
Black Prince—Bordeaux color, semi-double rose-red stamens. Late.
Celti Rosea—Semi-double, blush pink with golden stamens. Midseason to late.
Comte de Gomer—Double, pure white flecked pink. Midseason to late.
Christine Lee—Large, semi-double, deep pink with yellow stamens. Midseason.
Cleopatra—Early double red, splotched white. Extra fine.
Cup of Beauty (Tasse de Beau)—Midseason. Semi-double, pink.
Carnation—Early bright red.
C. M. Hovey—Double, large, red mottled white.
Colotti Maculata—Peony form, deep red marbled white.
Col. Firey—Very large and double, rich crimson.
Caprice — White semi-double petals frilled and veined. Midseason.
Canida Elegantissime—Double rose to light pink. Midseason.
Centifolia Alba—Semi-double white. Early.
Dante—Medium size pure white, full double. Midseason.

RARE CAMELLIAS (Cont'd)

Daikagura Variegated — Large full peony form, deep pink marbled white.
Daybreak—Medium size, fluffy peony form, soft pink.
Enchantress—Large bright red semi-double. Late.
Festiva—Medium size rose veined carmine. Midseason.

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Anne Lindberg—Red shading to ox blood, double. Late.
Brassenae — Large formal double. White marbled rose-red. Midseason.
Comte de Paris—Rose-pink, fully double, loosely built. Midseason.
Catherine Catheart — Large formal, pink mottled white. Medium late.
Chastity—Large full peony, white with creamy center. Midseason.
Due de Bretagne—Small, rose color, blotched with white, imbricated. Late.
Donckelari—Large, semi-double, brick-red, flecked white. Early.

Prices on Extremely Rare Camellias
Group I

12 to 18 inch	$5.00 each
2½ to 3 feet	7.50 each
Rooted Cuttings	1.50 each

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THE HOME BOOK OF TREES AND SHRUBS, Second Edition, by J. J. Levison, M. F. (Alfred A. Knopf, Inc., 501 Madison Ave., New York, New York. 1949. $10.00)

This is a manual and a guidebook to trees and shrubs. It covers their identification, selection, planting, and care. It is an *essential* book for everyone interested in trees and shrubs for the home grounds, streets, parks, and country. It will help anyone to make beautiful plantings economically and lastingly. The language is simple and non-technical, but accurate and based upon a long and varied experience. The amateur can, with this book, work out for himself a basically correct plan for the selection and handling of trees and shrubs for his own home grounds. It is an invaluable reference for the home owner, amateur and professional gardener, and landscape designer.

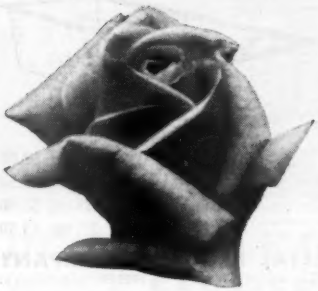
One of the most important and fundamental aspects of this book is that it stresses the fundamental idea that in our planting and home landscaping, we must turn to nature itself for guidance as well as inspiration. It represents the principles of organic gardening applied to trees and shrubs. Men and women who want to surround their homes, whether large or small, with the enduring beauty of growing things will thus find that the most effective methods of planting and care are not only the wisest and most beautiful, but the most natural, the most satisfying, and actually the most economical.

This large book which measures approximately 8 by 11 inches is beautifully printed and profusely illustrated with drawings and half tones. Cloth bound. 560 pages. Common names and botanical equivalents. Complete index.

THE LONG CROOKED RIVER by Richmond E. Myers (The Christopher Publishing House, Boston, Mass. 1949 $4.00)

Farmers and gardeners have always been interested in rivers. They represent the life stream in a healthy landscape. But now our rivers are running in mud and are dying. This book is the story of a river and the valley through which it flows. It is a many-

Brownell Roses



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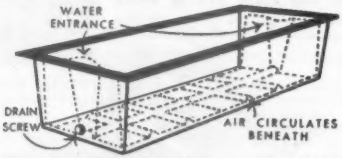

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ORGANIC HUSBANDRY—A SYMPOSIUM. (The Biotechnic Press, LTD., BCM/Biotechnic, London, W.C. 1, England, 2/9—$.56)

This is a timely symposium on all aspects of organic husbandry. Reading this book is like eating fruits from a basket full of the most varied sorts. Each of the many articles are filled with some essential details of organiculture. The organic gardener will find this a handy book to have around for improving the few minutes while waiting for a meal or for an appointment. None of the articles require more than a few minutes to read.

THE SECOND FORTY YEARS by Edward G. Stieglits, M.D., F.A.C.P., (J. B. Lippincott Company, Philadelphia and New York. 1946 $3.95)

The author gives to his readers a straightforward, popular presentation of what a scientist knows about man. This book is an authoritative handbook concerning the universal problems that come with advancing age. It contains practical advice on how to eat, how to work, how to play, and how to ward off the degenerative conditions which so often accompany an aging body. Cloth bound. 317 pages.

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COMPOST WITHOUT TURNING

Q. I have plenty of material for making compost, and would like to compost my entire five acre plot. Would I get the same results if I just pile the materials together and allow them to remain until they are decomposed?

T. R., Oakdale, California

A. No. Good compost can be made without turning by hand if the materials are carefully layered in the heap which is well-ventilated and has the right moisture content. When the heat of fermentation has subsided, add composting earthworms to do the turning. In this way compost is made in the large compost pits on the organic gardening experimental farm.

—o—

COTTON COMBINGS

Q. Can cotton combings and cotton be used as plant material in the compost heap?

N. H., Akron, Ohio

A. Cotton and cotton combings may be used in the compost heap as part of the green matter. In addition to organic matter they contain 1.32 percent nitrogen, 0.45 percent phosphoric acid, 0.36 percent potash as well as certain trace elements.

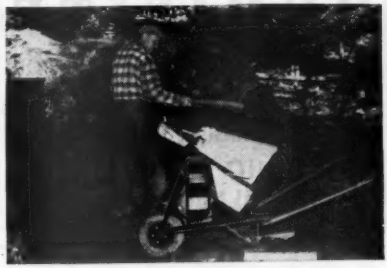
—o—

CORN COBS

Q. Can corn cobs be used as a mulch or as a raw material for compost?

E. M. L., Norborne, Missouri

A. Finely ground corn cobs make an excellent mulch and may be used as part of the green material in the compost heap. They may be purchased in this finely ground condition, and often are used in this form as chicken house litter. Corn cobs may be ground with any type of cutter, as



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an ensilage cutter, cutter type of plant shredder, or hammermill if thoroughly dry. Corn cobs contain in addition to organic matter 0.02 percent calcium, 0.04 percent nitrogen, 0.08 percent phosphoric acid, and 0.55 percent potassium.

—o—

BLUEBERRIES

Q. Will blueberries grow and bear fruit in Ohio?

M. K. Cleveland, Ohio.

A. Yes, blueberries will grow and bear fruit in Ohio providing you meet the soil requirements of these plants. In planting them it is necessary to enrich the soil with compost made of wood and leaves. This can be collected in any woodland, and is commonly referred to as leafmould. It is well to place in the bottom of the holes some partially decayed hemlock logs and then fill the hole with leafmould.

—o—

COCKLEBURS

Q. I have a field that is infested with cockleburs. How may I get rid of them?

Mrs. H. G., Forest City, Iowa.

A. Cockleburs can be controlled by clean cultivation, followed by hand

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AT the request of thousands of farmers from all parts of the United States and Canada, the ORGANIC GARDENING ORGANIZATION has launched a new *farm magazine*, called THE ORGANIC FARMER. This magazine will be devoted exclusively to all aspects of farming such as crop rotations, the reclamation of abandoned farms, soil management, soil building and fertilizer practices, and other fundamental agricultural practices based on *the organic method*. THE ORGANIC FARMER will in no way duplicate material published in *Organic Gardening Magazine*. It will be concerned with the organic method as related to farms however small or large.

Sufficient tests of the organic method on a farm scale have been made to prove that this method is not only practical but highly profitable. Cover crops as green matter and sheet composting enable the farmer to make compost on a farm scale without special equipment or additional labor.

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GLEN RIDGE, NEW JERSEY

hoeing and weeding. The waste places should be mowed before the fruits of cockleburs growing there are formed.

—o—

LADYBIRD

Q. Today while not far from my compost pile I had the good fortune to witness one of the balances in nature of which you have written so often. I beheld a cutworm writhing in agony. I picked it up and to it was attached a small black "bug". My son and I watched this "bug" devour the cutworm. We used a magnifying glass and noted that the cutworm soon shrank to nothing. I am enclosing this cutworm-eating insect under a piece of scotch tape. Can you tell me its name?

Mrs. W. O., Pittsville, Wisconsin

A. The little black "bug" which you enclosed in your letter is a larva of the ladybird. Both larvae and adult ladybirds feed on insects which are injurious to garden plants.

—o—

RAW PEANUTS FOR EARTHWORMS

Q. Do you recommend raw peanuts as food for earthworms? I have been using them instead of bread with very favorable results.

Dr. C. B. S., Missoula, Montana.

A. Raw peanuts may be used as a source of proteins by earthworms.

New Size and Colored Covers for Organic Gardening.

Beginning with the January issue of ORGANIC GARDENING, the size will be increased from 6¼" x 9½" to 8¼" x 11", the standard size of most garden magazines. The covers will be in brilliant four color renditions of flowers comparable to the best in this field. The number of pages will remain the same, thus giving an extra dividend of reading matter. Watch for the new, much improved,

ORGANIC GARDENING

They should be ground and fed in small amounts frequently rather than added to the culture in large amounts.

—o—

LENTILS

Q. What are lentils?

C. K. N., Oceano, California.

A. Lentils are legumes which have been cultivated since the Bronze Age and represent one of the oldest food plants known to man. They are native to the Mediterranean area and are grown in South Europe, North Africa, and Asia. They grow in light soils and require no special care.

—o—

SHADY GROUND COVER

Q. What plants may be used as a ground cover in places too shady for the shady-lawn grasses?

A. G., Washington, D. C.

A. Excellent ground covers for shady places where lawn grasses do not thrive are *Vinca minor* (myrtle), pachysandra, Christmas rose, English ivy, and violets.

—o—

FERTILIZERS FOR FERNS AND RHODODENDRONS

Q. What is the best fertilizer to use for ferns, laurels, and rhododendrons?

Miss G. R., Wilkes-Barre, Pa.

A. The best fertilizer for ferns and rhododendrons is compost made from woody plant materials and leaves. This compost is slightly acid and contains the humus and mineral elements

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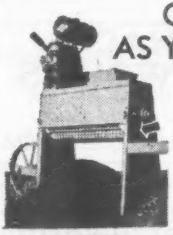

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required by plants which grow naturally in woodlands. Mountain laurel is a species of rhododendron which drops its leaves in the autumn.

—o—

DRAINAGE FOR ROSES

Q. Is it necessary to dig out the soil to a depth of two feet in preparing a rose bed?

N. H. N., Sioux City, Iowa.

A. Roses can grow only in well-drained soil. In gravel or sandy soil, it may not be necessary to make a deep hole to insure drainage, but it is important, regardless of type of soil, to provide the rose plants with an abundant supply of humus. In clay soil, it may even be necessary to dig a drainage trench from the rose bed to a lower soil level. Roses are heavy feeders and must have lots of humus in the soil.

—o—

COMPOST FOR BLUEBERRIES

Q. Will you please advise me what materials may be used to make compost for blueberry land?

K. R. F., Farmington, N. H.

A. Blueberries require an acid soil for normal growth and development. Compost for blueberries should be made of plant materials which should include up to 20 per cent sawdust and 10 per cent oak (finely ground, if possible) leaves with such other plant materials as may be available. Instead of using soil in the compost heap, use acid peat. Omit lime or other alkaline soil amendments from the heap.

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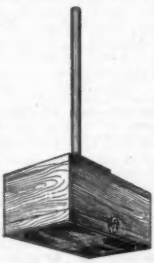

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